TECHNICAL
DOCUMENTATION

REST APIs for 23.5

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Overview of the Illumio REST API

The Illumio API is a RESTful API that uses JSON over HTTPS. JSON encodes all data transfer in both directions, so everything sent to and received from the API is encoded in JSON.

To work with the Illumio API, you need to be authorized by an Illumio administrator and have the appropriate authentication credentials.

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API Classification and Version

This section explains the distinction among the Illumio Public Stable, Public Experimental, and private APIs.

Public Stable APIs

The Public Stable APIs are generally available to all Illumio customers, are documented, and are stable. “Stable” means that Illumio will not introduce any further breaking changes to the API. If a breaking change is required, another version of the API will be introduced, and the previous version will continue to be supported for a minimum of six (6) months.

Public Experimental APIs

The Public Experimental APIs are generally available to all Illumio customers and are documented, but they are subject to change from release to release. If you use experimental APIs, such as in scripts, be aware that some of them might change. Some of these APIs might be promoted to Public Stable or made no longer available at a future date.

This API guide uses orange headings inside these files to help distinguish which APIs are "Public Experimental".

Private APIs

In addition to the Public Stable or Public Experimental APIs, the Illumio Core includes additional Private APIs used by the PCE web console. The private Illumio APIs are not exposed to end-users, are not documented, and are not supported for use.

Illumio REST API Versions

Illumio REST APIs follow the release versions of other Illumio components, such as the PCE and VEN.

Illumio REST API Schema Files

Illumio REST API schema files follow the standard JSON schema form described at http://json-schema.org/. The file name convention is the Illumio REST API URL name with underscore rather than slashes. For example, for the login API, the payload schema file is named `user_login_get.schema.json`.

REST API URIs

This section describes the URI syntax used with this API, which can differ depending on the REST call you are making and the types of Illumio resources you are operating on.

API Version and Org HREF

The API version and organization HREF are two variables used in every call made to this API.

The current version of the Illumio Core REST API is version 2 (v2), which is represented in method URIs by the `[api_version]` variable.

NOTE

You can determine the organization HREF for the PCE when you use the login API to authenticate with the PCE and obtain a session token. In method URIs, this value is represented by the `[org_href]` variable.

In response to using the login API, the organization HREF is listed as shown, but depends on the version of the API you are using:

```
"orgs": [
    {
       "org_id": 2,
       "org_href": "/orgs/2",
```

Note that both `[api_version]` and `[org_href]` begin with a forward slash:

- `[api_version]` - `/api/v2`
- `[org_href]` - `/orgs/2`

For example, to get a collection of labels that exist inside an organization, construct the URI as follows, with the API version and the organization HREF shown in blue font:

```
GET [api_version][org_href]/labels
```

To get all of the API keys created by a specific user, construct the URI as follows, with the HREF path to the user shown in a blue font:

```
GET api/v2/orgs/1/api_keys
```

Port Number

The port number used in the code examples is 8443, which is the default; however, since the port number might differ depending on the implementation, ask your Illumio system administrator which port number to use when making calls to the Illumio Core REST API.

GET Collections URI Syntax

The base URI for Illumio REST API endpoint for GET collections:

```
GET http://[pce_hostname]:[port][api_version][org_href]/[api_endpoint]
```

IMPORTANT

When making API calls, the `[pce_hostname]` or `[pce_hostname]:[port]` should not end with a forward slash ('/'). This is because `[api_version]` begins with a forward slash.

For example, the URI for getting a collection of workloads uses this syntax:

```
GET https://pce.my-company.com:8443/api/v2/orgs/1/workloads
```

In the rulesets API, you also have the ability to get all of the rules ("`sec_rules`") contained in a ruleset. The URI syntax for this operation is as follows:

```
GET http://[pce_hostname]:[port][api_version][object_href][api_endpoint]
```

For example:

```
GET [api_version][ruleset_href]/sec_rules
```

Non-GET Collections URI Syntax

For the non-GET methods of PUT, POST, and DELETE, the object HREF is listed as the endpoint, as shown here:

```
PUT [api_version][object_href]
```

The relative path of the `[api_version]` ("`api/v2/")` indicates that version 2 of the API is in use.

In the URI above, `[org_href]` is not added because it is included in the `[object_href]` string. For example, this is the `[object_href]` for a workload:

```
/orgs/2/workloads/3e3e17ce-XXXX-42b4-XXXX-1d4d3328b342
```

Another case is performing PUT, POST, or DELETE operations on the rules contained in a ruleset. The URI syntax is the same as a GET operation.

Security Policy Items and ":pversion"

The URI for security policy items is as follows:

```
[pce_host][port][api_version][org_href]/sec_policy/draft/[api_endpoint]
```

This API operates on provisionable objects, which exist in either a `draft` (not provisioned) state or an `active` (provisioned) state.

Provisionable items include label groups, services, rulesets, IP lists, virtual services, firewall settings, enforcement boundaries, and virtual servers. For these objects, the URL of the API call must include the element called `:pversion`, which can be set to either `draft` or `active`.

Depending on the method, the API follows these rules:

- For GET operations — `:pversion` can be draft, active, or the ID of the security policy.
- For POST, PUT, DELETE — `:pversion` can be draft (you cannot operate on active items) or the ID if the security policy.

REST API Limits

When making API calls, make sure that you take into account the allowed maximum number of calls per minute, returned objects, or total item count.

IMPORTANT

Any tooling that parses the HTTP headers should be changed to allow case-insensitive header name matching in order to retain compatibility with future PCE releases. Refer to RFC 7230, section 3.2, "Header Fields," which states that field names should be case insensitive.

API Rate Limits and DOS Protection

The Illumio REST API is rate-limited and allows only a maximum of 500 requests per minute per user session or API key. The rate is set to maintain the PCE performance and service availability and to prevent malicious attackers from attempting to disrupt a service (for example, DoS attacks). If the set rate limit is reached, the call returns an HTTP error `429 Too many requests`.

Limits for Bulk Operations

In addition to the rate limits described above that are counted for all requests, the unpair workloads and delete traffic flows APIs have a rate limit of 10 calls per minute. There are also two limits on the number of resources that can be operated per call.

API Call and Endpoint	Request Rate Limit	Item Limit	Exposure
Unpair Workloads `PUT [api_version][org_href]/workloads/unpair`	10 per minute	1000 workloads per request	Public Stable

NOTE

Illumio reserves the right to adjust the rate limit on the Illumio Secure Cloud for given endpoints at any time to ensure all clients receive a high-quality service.

Ruleset Rules Display Limit

The PCE web console supports up to 500 rules per ruleset. Rulesets with more than 500 rules cannot be fully displayed in the PCE web console.

GET Collection Request Limits

By default, when you perform a synchronous GET request with this API, the maximum number of objects returned is 500.

Some GET APIs provide query parameters to help restrict the number of results, depending on the API. For example, the workloads API provides multiple query parameters for GET collections, such as `label`, `ip_address`, `policy_health`, and more.

If you want to get more than 500 objects from a GET collection, use which runs the request as an offline job. Job results can be downloaded after the job finishes.

Checking Total Item Count

To find out how many items exist for a given resource, such as whether there are more than 500 workloads in the PCE, first check the number of items using the `max_results` query parameter on a GET collection and then view the header of the response for the total item count for the resource.

If the total item count is less than 500, you can perform a regular GET collection for the results. If the total item count is more than 500, use Asynchronous GET Collections.

For example, make the following GET call on a collection of workloads with the `max_results` query parameter set equal to 1, then check the header to see how many workloads exist in your organization.

NOTE

When using multiple query parameters, enclose the URI, endpoint, and query_params in single or double quotes.

```
GET 'https://pce.mycompany.com:8443/api/v2/orgs/7/workloads?
max_results=1&managed=true'
```

You can check the HTTP response header for the '`X-Total-Count`' field, which indicates the total number of workloads. In this example, the total count shows 71 (highlighted in blue font), so a regular GET collection is appropriate. An asynchronous GET collection would be used if the value were more than 500.

```
Cache-Control no-store
Content-Encoding gzip
Content-Type application/json
Date Wed, 07 Sep 2016 14:01:00 GMT
ETag W/"025cc8bfcXXXXXXXXXX7900081e7c6cb"
Status 200 OK
Transfer-Encoding chunked
Vary Accept-Encoding
X-Matched-Count 71
X-Request-Id d43a8ce9-XXXX-4453-XXXX-dde79XXX0fa8
X-Total-Count 71
```

Character Limits on Resource Names

The PCE has a 255-character limit for each name string when naming resources. This JSON property is listed as `name` in the API.

For example, this 255-character limit applies to naming workloads, labels, IP lists, and services.

However, the PCE does not have a character limit for the description field, which typically follows a resource's name.

HTTP Requests and Responses

This section explains how to formulate HTTP requests and read HTTP responses.

HTTP Request Headers

Set an `Accept: application/json` header on all `GET` operations (optional for `DELETE` operations):

```
-H 'Accept: application/json'
```

Set a `Content-Type: application/json` header on `PUT` and `POST` operations:

```
-H 'Content-Type: application/json'
```

HTTP Request Body

Most of the parameters and data accompanying requests are contained in the body of the HTTP request. The Illumio REST API accepts JSON in the HTTP request body. No other data format is currently supported.

PUT Operations

Illumio REST API PUT operations modify a subset of attribute-value pairs for a specified resource. The attributes that are not specified in the PUT operation are left unmodified.

For example, to update a user's phone number (using the Users API) without modifying the user address, call PUT with a request that only modifies the phone number, and only the phone number is changed.

Response Header Request-ID

The Illumio REST API provides a useful troubleshooting feature that returns a unique `Request-ID` in the HTTP response header on calls made with this API.

You can provide the `Request-ID` when opening Illumio support tickets, explicitly designed for operations that produce errors. The `Request-ID` helps Illumio support troubleshooting specific operations and errors.

If you are using curl to make REST API calls to the PCE, you can specify the curl `-D` flag plus a file name to write the response header to a file.

The following example shows a curl command to get a collection of workloads. It uses the `-D` flag to write the response header to a file named `temp_header`.

```
curl -i -X GET https://pce.my-company.com:8443/api/v2/orgs/2/workloads -H
"Accept: application/json" -u $KEY:$TOKEN -D temp_header
```

The file contains the response header of the call (highlighted in blue bold font):

```
HTTP/1.1 200 OK
Server: nginx
```

```
Date: Wed, 09 Dec 2015 16:58:00 GMT
Content-Type: application/json
Content-Length: 2193032
Connection: keep-alive
Vary: Accept-Encoding
Vary: Accept-Encoding
Status: 200 OK
X-Total-Count: 1406
X-Matched-Count: 1406
ETag: "523d67cbd57b18d0e97bc8e7555142eb"
Cache-Control: max-age=0, private, must-revalidate
X-Request-Id:

9722c8b5-94dc-4a50-853a-8e8f22266528

Cache-Control: no-store
Pragma: no-cache
```

Response Types

The HTTP response includes:

- An HTTP status code
- A response body that contains data in JSON format:
  - Your requested data if successful
  - An error code and message if there is an error

HTTP Status Codes — Success

The following table lists all expected success codes returned when you use the Illumio REST API:

HTTP Code	Description
`200 OK`	Successful operation where JSON body is returned
`201 Created`	Successful `POST`operation where an object was created
`204 No Content`	The operation succeeded, and nothing was returned.

HTTP Status Codes — Failure

All Illumio REST API methods (GET, POST, PUT, and DELETE) might fail with an error in the `400` range. The error code `400` usually means that either the resource is not available (such as trying to update a previously deleted label), or there is a mistake in the URL (such as specifying `/shlabels` instead of `/labels`).

Other errors that might occur:

HTTP Code	Description
400 Bad Request	Something in the curl request was not correct, for example, "curl **-X -I** GET" instead of "curl **-I -X** GET"
401 Authentication failure or HTTP/1.1 401 Unauthorized	For example, the user attempted to make an API call but forgot to log in, username or password were incorrect or missing, or a missing space before "**-u**"
403 Authorization failure	For example, the user is not authorized to make the call.
HTTP/1.1 403 Forbidden	For example, using the incorrect HTTP method (like using GET instead of POST), the incorrect `org_id` parameter was used.
404 Invalid URL	
HTTP/1.1 404 Not Found	For example, an incorrect API version number /api/**v191**/, missing or incorrect **org_id**, `/orgs/{org_id}/`, wrong URL, or a misspelled endpoint.
404 Page not found	For example, the wrong org_id in the URI or missing blank space before an option dash, like before **-H 'Accept: application/json'**
405 Method not allowed	For example, if you perform a POST on a resource that only allows PUT.
406 Invalid payload	The JSON request payload was constructed improperly.

Other Failure Codes

```
-bash: -H: command not found HTTP/1.1 401 Unauthorized
```

- This can be caused if more than one query parameter is used and the `URI` (including the query parameters) is not enclosed with single quotes or double quotes.
  Example:
  `'https://pce.my-company.com:8443/api/v2/orgs/2//workloads?managed=true&max_results=1'`

curl: (3) Illegal port number

- For example, a missing blank space between `-u uname:'pswd'` and the next option, for example `-H 'Accept: application/json'`.

parse error: Invalid numeric literal at line 1, column 9

- It can be caused by an incorrect curl command, for example, including a path parameter that isn't allowed, like using orgs/org_id for an endpoint that doesn't use it. This is also a known JSON query bug caused by using `-i` in a curl command that uses json-query. To see the headers returned from the curl command, remove json-query from the curl command and use `-i`, for example, "curl `-i` -X GET ..."

curl: (23) Failed writing body

- It can be caused by calling an endpoint that doesn't exist.

The property '#/' of type null did not match the following type: object in .xxxxxxx.schema.json

- It can be caused by a missing or incomplete request body.

[{"token":"input_validation_error","message":"input validation failed. Details: {The property '#/' of type NilClass did not match the following type: object in schema xxxxx.schema.json}"}]

- Is the wrong `-H` value being used? For example, is `-H 'Accept: application/json'` being used for a PUT or a POST instead of `-H 'Content-Type: application/json'`?

Request Calls Using Curl

This section explains how to use curl commands to work with Illumio APIs by defining some standard options and constants.

Curl Overview

Curl is a common command-line data transfer tool for making API calls and is especially useful in scripts written for automated tasks.

The syntax for using curl with the API for logging a user into the PCE is as follows:

```
curl -i -X <HTTP method> <uri_of_api> <header> -u $KEY:$TOKEN -Options
```

The syntax for using curl with the API for PUT operations using an API key for authentication is as follows:

```
curl -i -X PUT <URI of API> -H "Content-Type:application/json" -u
$KEY:$TOKEN -d '{ "json_property": "property_value", "json_property":
"property_value" }'
```

For example:

```
curl -i -X PUT https://scp.illum.io:8443/api/v2/users/11/local_profile/
password -H "Content-Type:application/json" -u $KEY:$TOKEN -d
'{ "current_password": "NotMyReal_Old*96Password", "new_password":
"NotMy*76New!pswd" }'
```

Curl-specific Options

For the curl examples provided in this API documentation, a few standard curl options are defined as follows.

The user and password to use for server authentication:

```
-u/--user <user:password>
```

For brevity, code examples typically use constants for `-u` username:'password' arguments. $TOKEN represents an authentication token (a string enclosed by single quotes to prevent it from unintentionally expanding):

```
-u $KEY:$TOKEN
```

(HTTP) Header to use when getting a web page:

```
-H/--header <header>
```

(HTTP) Specify an HTTP method to use when communicating with the HTTP server:

```
-X/--request <command>
```

Example:

```
-X POST
```

(HTTP) Send the specified data in a POST request to the HTTP server in a way that emulates a user filling in an HTML form and clicking **Submit:**

```
-d/--data <data>
```

Example API Call Using CURL

To get all of the API keys of a specific user using the user's session credentials:

```
curl -i -X GET https://scp.illum.io:8443/api/v2/users/11/api_keys -H
"Accept: application/json" -u $KEY:$TOKEN
```

Using Curl with json-query

When using json-query to format the output of curl commands, be aware that due to a json-query bug, this does not work with the curl `-i` option, which displays response headers. When you use the curl `-i` option, such as to see the total number of workloads when using `GET workloads`, you might get various error messages like `curl: (3) Illegal port number`. To work around this issue, remove the `-i` option and retry the curl command.

Authentication and API User Permissions

To use the REST APIs, you must be an authorized Illumio user with credentials to log into the PCE.

You get authorized to perform a specific job according to the privileges granted to you based on the role-based access control (RBAC) and implemented by the Illumio administrator.

The PCE has two types of credentials that you can use to authenticate with it and make REST API calls:

- API keys, which provide a persistent means of authenticating
- Session credentials, which provide a temporary means of authenticating

Required Permissions for API Users

To use the REST APIs, you must be an authorized Illumio user with credentials to log into the PCE.

For authentication permissions for each REST API call, see the Illumio Core REST API Reference.

User Permissions and the API

Authentication to the PCE is based on three user roles that allow users to perform specific API operations:

- Organization owner: All `GET`, `POST`, `PUT`, and `DELETE` APIs
- Administrator: Most `GET`, `POST`, `PUT`, and `DELETE` APIs
- Read-only: `GET` only

The PCE also has two other kinds of roles:

- Unscoped: Not bound by label scopes
- Scoped: Bound by label scopes

Unscoped Roles

API Role Name	UI Role Name	Granted Access
`owner`	Global Organization Owner	Perform all actions: Add, edit, or delete any resource, organization setting, or user account.
`admin`	Global Administrator	Perform all actions except cannot change organization setting and cannot perform user management tasks.
`read_only`	Global Read Only	View any resource or organization setting. Cannot perform any operations.
`global_object_provisioner`	Global Policy Object Provisioner	Provision rules containing IP lists, services, and label groups, and manage security settings. Cannot provision rulesets, virtual services, or virtual servers, or add, modify, or delete existing policy items.

Scoped Roles

API Role Name	UI Role Name	Granted Access
`ruleset_manager`	Full Ruleset Manager	Add, edit, and delete all rulesets within the specified scope. Add, edit, and delete rules when the provider matches the specified scope. The rule consumer can match any scope.
`limited_ruleset_manager`	Limited Ruleset Manager	Add, edit, and delete all rulesets within the specified scope. Add, edit, and delete rules when the provider and consumer match the specified scope. Ruleset Managers with limited privileges cannot manage rules that use IP lists, user groups, label groups, or iptables rules as consumers, or rules that allow internet connectivity.
`ruleset_provisioner`	Ruleset Provisioner	Provision rulesets within a specified scope. This role cannot provision virtual servers, virtual services, SecureConnect gateways, security settings, IP list, services, or label groups

Session Credentials

While API keys provide a persistent means of authenticating with the PCE, session credentials provide a temporary means of authenticating so you can make Illumio REST API calls.

IMPORTANT

Any tooling that parses the HTTP headers should be changed to allow case-insensitive header name matching to remain compatible with future PCE releases. For more information, refer to RFC 7230, section 3.2, "Header Fields," which states that field names should be case-insensitive.

Choose a session token or an API key, depending on your programming needs.

Session Credentials and Tokens

When you create session credentials, an auth_username and session token are returned, which function as temporary usernames and passwords for making API calls.

Session credentials are used to make all Illumio REST API calls that require authentication and are composed of an `auth_username` and a token. They expire after not being used for 30 minutes and reset for another 30 minutes if used within the 30-minute window.

The session token expires after 10 minutes of inactivity.

When to Use a Session Token

An `auth_username` and session token are useful for one-time use of the API or testing the API. To write a script that performs a one-time use of the API with a session token, use the Login API to create the `auth_username` and session token. Use those credentials to make other API calls in the script, and then once the script has run, the session token immediately expires when the user logs out.

What Does a Session Token Look Like?

When you authenticate with the PCE using the Login API, the response returns the credentials needed to make other API calls:

- Your username: `"auth_username": user_3`
- Your session token: `"session_token":"xxxxxxx563199f92af7b705ddca26854205b5233"`

To use the Illumio REST API:

1. Call `login_users/authenticate` using the e-mail address and password you used to create your PCE account to obtain an **authentication token**.

   NOTE

   The authorization token expires after 30 seconds, so have the next call formed and ready to paste onto the terminal window before calling `login_users/authenticate`.

2. Call `users/login` with the authentication token to obtain temporary session credentials.

Use Login API to Create Session Credentials

Unless you're using persistent API credentials, whenever you want to access the Illumio REST API, you must authenticate with the PCE using an *auth username* and a *session token*. To create these session credentials, call `GET /users/login` with the authentication token previously returned by a call to `POST /login_users/authenticate`.

URI

```
GET [api_version]/users/login
```

API Call Using Session Credentials

Once you obtain an `auth_username` and session token from the PCE, you use them to make API calls.

For example, suppose you want to use this session token to get a collection of labels in an organization using the Labels API. In that case, the curl command can be written as shown below using the following authentication:

- auth_username: `user_3`
- Session Token: `xxxxxxx563199f92af7b705ddca26854205b5233`

```
curl -i -X GET https://pce.my-company.com:8443/api/v2/orgs/3/labels -H
"Accept: application/json" -u user4:'xxxxxxxx628f5773c47b72dbcd437b4a10d85'
```

API Keys

API keys provide a persistent means of authenticating with the PCE and are recommended for script writing.

This Public Stable API allows local users to create user API keys and use them as credentials to access the PCE.

There are two categories of API keys:

- **User-based API keys**
  These keys are based on specific owners and owners so that they can make API calls to the PCE.
- **Service-based API keys**
  These API keys are based on a service instead of a specific user.

Working with API Keys

When you create an API key, you receive an `api_username` and secret, which function as the username and password for making API calls.

An API key is permanent and does not expire (unless when deleted).

IMPORTANT

Any tooling that parses the HTTP headers should be changed to allow case-insensitive header name matching to retain compatibility with future PCE releases.

Refer to RFC 7230, section 3.2, "Header Fields," which states that field names should be case insensitive.

Use API keys to write scripts that run automatically without requiring a human user to authenticate the API call. Unless you are a read-only user, you can create multiple API keys and make API calls in your scripts.

You can also create different API keys for various functions. For example, you might use one API key to script automatic workload pairing and another API key to collect system events from Illumio.

When you create an API key, the response returns both the auth_username and the secret needed for authenticating other API calls:

- API username:
  "auth_username":"api_xxxxxxxxxx29" (represented in the code examples in this document as $KEY)
- API key secret: "secret":"xxxxxxx5048a6a85ce846a706e134ef1d4bf2ac1f253b84c1bf8df6b83c70d95" (represented in the code examples in this document as $TOKEN)

Get a Collection of all API Keys

You can now get a list of all API keys, both user-based and service account-based.

To query API keys regardless of their type, use this API:

```
GET /api/v2/orgs/:xorg_id/api_keys
```

Special Characters in API Calls

If a **username** or **name** in an API call contains special characters, these must be encoded for the call to succeed.

For example, for a service account name **sa&1**, instead of

```
api/v2/orgs/1/api_keys?type=service_account&name=sa&1
```

enter the call as

```
api/v2/orgs/1/api_keys?type=service_account&name=sa%261
```

Query Keys by Expiration

To retrieve the API keys based on the expiration (active or expired) use these APIs:

```
GET /api/v2/orgs/:xorg_id/api_keys?type=service_account&state=expired
```

```
GET /api/v2/orgs/:xorg_id/api_keys?type=service_account&state=active
```

REST API Users

This Public Stable API allows you to log your User into the PCE so you can get a session token to access other Illumio Core REST API calls. This API is your starting point for interacting with the PCE using the REST API.

Users API Methods

Functionality	HTTP	URI
Authenticate to the Illumio Login Service and obtain a single-use authentication token.	POST	[api_version]/login_users/authenticate
Create a new user.	POST	[api_version][users]
Log in a user and obtain a session token.	GET	[api_version]/users/login
Log out a user and destroy the session token.	PUT	[api_version][user_href]/logout
Get a user's information.	GET	[api_version][user_href]
Update user's information.	PUT	[api_version][user_href]
Change a user's password (a local, non-SSO user).	PUT	[api_version]/login_users/[user_href]/password

Log Into the PCE

URI to Log In User

```
GET [api_version]/users/login
```

For step-by-step instructions about authenticating to the PCE and using `GET /users/login` in conjunction with other methods, see Authentication and API User Permissions [20].

Log Out and Destroy Credentials

This API logs users out of the PCE and destroys the temporary session credentials used to log them in.

NOTE

This `PUT /logout` call is not used with persistent API credentials.

URI to Log Out a User

```
PUT [user_href]/logout
```

Request Body

The request body is an empty JSON object.

```
{}
```

Log Out a User

```
curl -i -X PUT https://pce.my-company.com:8443/api/v2/
authentication_services/password_policy -H "Content-Type: application/json"
-u $KEY:$TOKEN -d '{"require_type_symbol": true, "expire_time_days": 90}
```

Get User Information

This API retrieves specific information about a user, such as when the user logs into the Illumio PCE, the IP address from which the user logs in, the user's name, and the password.

URI to Get User Information

```
GET [user_href]
```

Create a New User

This API creates a new local user.

URI to Create a New User

```
POST [api_version][users]
```

Change the User Password

This API method allows currently authenticated users to change their login password.

- The call must be made **by the user currently authenticated** in the session; even an administrator cannot change another user's password.
- An API key is not used with this API.
- The user's login name (typically the user's e-mail address) and login password are used for authentication.
- The user's five most recent passwords cannot be used.

Possible Responses

When you execute the command to change a password, you can receive one of these three messages:

- `204 success`: The password was changed successfully.
- `406`: Validation error such as `invalid`.
- `501`: The password was changed, but the e-mail notification failed.

LDAP Authentication

This Public Experimental API provides user authentication with the PCE using LDAP with OpenLDAP and Active Directory.

LDAP authentication comes in addition to the two previously available methods:

- API keys, which provide persistent authentication, and
- Session credentials, which provide temporary authentication.

Prerequisites and Limitations

Before configuring LDAP for authentication with the PCE, it is important to provide the required prerequisites and review any limitations.

Determine Your User Base DN

Before you map your LDAP settings to PCE settings, determine your user base Distinguished Name (DN). The DN is the location in the directory where authentication information is stored.

If you don't have this information, contact your LDAP administrator for assistance.

When configuring the PCE to work with LDAP, be aware of the following:

- PCE uses LDAP protocol version 3 ("v3").
- Supported LDAP distributions include OpenLDAP 2.4 and Active Directory.
- Supported LDAP protocols include LDAP, LDAPS, or LDAP with STARTTLS.

Limitations

These are the current limitations for LDAP authentication:

- Any locally created user has precedence over an LDAP user of the same name. For example, if the LDAP server has a user with a username attribute (such as `cn` or `uid`) of **`johndoe`** and the default PCE user of the same name is present, the PCE user takes precedence. Only the local password is accepted. The roles mapped to the local user will be in effect on login. To work around this limitation, you must delete the specific local user.
- LDAP and SAML single sign-on authentication methods cannot be used together. In this release of the PCE, an organization can either use LDAP or SAML single sign-on to authenticate external users.
- This release enables LDAP configuration via REST APIs only.

LDAP Authentication for the PCE

The PCE supports user and role configuration for LDAP users and groups. You can configure up to three LDAP servers and map users and user groups from your LDAP servers to PCE roles.

Before you configure LDAP, review the LDAP prerequisites and considerations topic in this document.

Authentication Precedence

PCE local authentication takes precedence over any external systems. The PCE authenticates a user in the following order:

1. The PCE first attempts local authentication. If the account expires or fails, the PCE will not try to log in using LDAP authentication.
2. If the local user does not exist, the PCE attempts to log in to LDAP (if enabled).

Configuration Steps

To configure the PCE to work with LDAP, perform these steps:

1. Enable the PCE to use LDAP authentication. See Enable LDAP Authentication. [29]
2. Set up an LDAP configuration.

   When searching for LDAP users, the PCE follows the order in which the servers were configured. By default, the configurable request timeout is 5 seconds. Once the request time expires, the PCE attempts to connect to the next server in the configuration.

   For example, assume that you configure three LDAP servers in this order: A, B, and C. The PCE will search the servers in that same order. If it finds a user on server A, it stops even if the same user also exists on servers B and C. The PCE will try to use A's credentials for that user, but if it fails to connect to A, it searches the remaining servers: first B, the search proceeds following the expiration of the connection timeout.
3. Map your LDAP groups to one or more PCE roles.

Set up the PCE for LDAP Authentication

The PCE supports LDAPS and LDAP with STARTTLS. To use the PCE with secure LDAP with SSL/TLS certificates, add the certificate chain to the local certificate store on the PCE.

Using REST APIs for LDAP Configuration in the PCE

The following table provides an overview of the REST APIs available to configure the PCE for LDAP Authentication. For information about the parameters for these REST APIs, see LDAP Authentication Reference.

APIs for LDAP Configuration

PCE APIs	HTTP | URI
Retrieve the PCE authentication settings.	`GET [api_version]/authentication_settings`
Update the PCE authentication settings.	`PUT [api_version]/authentication_settings`
Retrieve the LDAP configuration.	`GET [api_version]/authentication_settings/ldap_configs`
Get instance	`GET [api_version]/authentication_settings/ldap_configs/:uuid`
Create an LDAP configuration.	`POST [api_version]/authentication_settings/ldap_configs`
Update an LDAP configuration.	`PUT [api_version]/authentication_settings/ldap_configs/:uuid`
Delete an LDAP configuration.	`DELETE [api_version]/authentication_settings/ldap_configs/:uuid`
Verify the connection to the LDAP server.	`POST [api_version]/authentication_settings/ldap_configs/:uuid/verify_connection`

Enable LDAP Authentication

This section explains how to use the API to enable the PCE for LDAP authentication. Before invoking this API, you must enable the LDAP preview feature in the PCE. For the steps to enable this preview feature, see LDAP Authentication .

URI

```
PUT /api/v2/authentication_settings
```

Request Body

Property	Data Type	Required	Description
authentication_type	enum	Yes	The type of authentication

Enum Item	Purpose
Local	Local DB authentication
SAML	SAML authentication enabled
RADIUS	RADIUS authentication enabled
LDAP	LDAP authentication enabled

Example Payload to Configure LDAP Authentication

```
{
"authentication_type": "LDAP",
}
```

Response Code

The following response codes can be returned:

- 200 indicates success
- 403 indicates the user is not an org owner
- 406 indicates invalid parameters

Asynchronous GET Collections

When using the standard synchronous GET method on more than the maximum allowed number of 500 resources, only the *latest* 500 results are returned.

To GET all the results when the number of resources exceeds 500, specify in the header that the call is asynchronous ("async"), which then executes the request as an offline job.

Overview of Async GET Requests

An asynchronous job collects and downloads all matching records as a single job. You can configure a script to continuously poll the job until it is done and then download the job results using the job location HREF listed in the response.

Collection vs. Instance

GET collection methods return HREF path properties for each resource. Perform other REST operations on individual instances of these resources (such as POST, PUT, and DELETE) using the HREF to identify the resources to operate.

For example, the response body for the API to get a collection of labels returns a list of labels, where each one is identified as an HREF path. In this instance, the general syntax for the API call looks like this:

```
GET https://scp.illum.io:8443[api_version][org_href]labels
```

`[org_href]` identifies the organization from which you want to get a collection of labels.

A single label instance in the response is identified by its HREF path:

```
{
    href: "/orgs/2/labels/8"
    key: "env"
    value: "Prod"
    created_at: "2020-01-22T18:24:33Z"
    updated_at: "2020-01-22T18:24:40Z"
    created_by: {
    href: "/users/9"
    }
    updated_by: {
    href: "/users/9"
    }
}
```

To perform other operations on this label (href: "`/orgs/2/labels/8`"), you can provide this HREF in the API call to operate on this label instance.

For example:

```
PUT https://scp.illum.io:8443/api/v2/orgs/2/labels/8
```

Async GET Supported APIs

These APIs support async GET collections:

Description	Resource Type	Exposure
agents/update	`GET [api_version][org_href]/agents`	Experimental
	`GET [api_version][org_href]/agents/update`	Experimental
audit_log_events	`GET [api_version][org_href]/audit_log_events`	Experimental
auth_security_principals	`GET [api_version][org_href]/auth_securiuty_principals`	Experimental
authentication_settings/ password_policy	`GET [api_version][org_href]/authentication_settings/ password_policy`	Experimental
datafiles	`GET [api_version][org_href]/datafiles`	Experimental
events	`GET [api_version][org_href]/events`	Experimental
jobs	`GET [api_version][org_href]/jobs`	Experimental
labels	`GET [api_version][org_href]/labels`	Both
network_devices/ network_endpoints	`GET [api_version][org_href]/network_devices/net- work_endpoints`	Experimental
network_enforcement_nodes	`GET [api_version][org_href]/network_enforcement_nodes`	Experimental
node_available	`GET [api_version][org_href]/node_available`	Both
Pairing Profiles	`GET [api_version][org_href]/pairing_profiles`	Experimental
permissions	`GET [api_version][org_href]/permissions`	Experimental
security_principals	`GET [api_version][org_href]/sec_policy/draft/securi- ty_principals`	Experimental
system_events	`GET [api_version][org_href]/system_events`	
vulnerability_reports	`GET [api_version][org_href]/vulnerability_reports`	Experimental
sec_policy/draft/		
allow	`GET [api_version][org_href]/sec_policy/draft/allow`	Experimental
dependencies	`GET [api_version][org_href]/sec_policy/draft/depend- encies`	Experimental
ip_lists	`GET [api_version][org_href]/sec_policy/draft/ip_lists`	Both
label_groups	`GET [api_version][org_href]/sec_policy/draft/la- bel_groups`	Experimental
label_groups/member-of	`GET [api_version][org_href]/sec_policy/draft/la- bel_groups/member-of`	Experimental
modified_objects	`GET [api_version][org_href]/sec_policy/draft/modi- fied_objects`	Experimental

Description	Resource Type	Exposure
pending	`GET [api_version][org_href]/sec_policy/draft/pending`	Experimental
rule_sets	`GET [api_version][org_href]/sec_policy/draft/rule_sets`	Both
rule_sets/sec_rule	`GET [api_version][org_href]/sec_policy/draft/rule_sets/sec_rules`	Both
services	`GET [api_version][org_href]/sec_policy/draft/services`	Both
virtual_service	`GET [api_version][org_href]/sec_policy/draft/virtau-al_services`	Both
settings/		
settings	`GET [api_version][org_href]/settings`	
syslog/destinations	`GET [api_version][org_href]/settings/syslog/destina-tions`	Experimental
workloads	`GET [api_version][org_href]/settings/workloads`	Experimental
users/		
users	`GET [api_version][org_href]/users`	Stable
api_keys	`GET [api_version][org_href]/users/api_keys`	Both
orgs	`GET [api_version][org_href]/users/orgs`	Experimental
login	`GET [api_version][org_href]/users/login`	Stable
workloads/		
workloads/	`GET [api_version][org_href]/workloads`	Both
interfaces	`GET [api_version][org_href]/workloads/interfaces`	Both

Async Job Operations

To create the asynchronous GET job request, set the following preference:

```
-H 'Prefer: respond-async'
```

Setting this preference executes the request during low-traffic times as an asynchronous job in the background, which lightens network traffic loads.

Workflow for Async Job Operations

The workflow for requesting an asynchronous bulk job consists of the following tasks:

1. Create the asynchronous GET job request.
2. Poll the job until the status is "Done" or "Failed."
3. Obtain the HREF of the completed request job.
4. Use the HREF to get the results of the request job.

Create an Async Job Request

This example demonstrates a request for an asynchronous collection of labels.

NOTE

Use query parameters for a filtered job request, such as to return only the environment labels: `.../labels?key=env`

URI to Create a Job Request

```
GET [api_version]/labels
```

The asynchronous collection header is highlighted in blue bold font:

```
curl -i -X GET 'https://pce.my-company.com:8443/api/v2/orgs/1/labels' -H
'Accept: application/json' -H 'Prefer: respond-async' -u $KEY:$TOKEN
```

Response with a Job Status

The response is `202 - Accepted`, which includes `Location`, the header `Retry-After` , and an empty body:

```
Server: nginx
Date: Thu, 14 Jan 2016 23:16:52 GMT
    "location": https://pce.my-company.com:8443/api/v2/orgs/1/jobs/
d1775367-1951-4707-aa2e-37a0b9076d31",
    Retry-After: 5
    Transfer-Encoding: chunked
    Connection: keep-alive
    Status: 202 Accepted
    Cache-Control: no-cache
    X-Request-Id: 36aae8ce-82ed-4a6a-8a76-77d2df78daff
```

Poll the Job

After submitting the job request, poll the job using the suggested `Retry-After` time to determine when the job is complete.

URI to Get the Status of the Job

The following example demonstrates how to poll the job to determine its status.

```
GET [api_version][org_href]/jobs/[href]
```

Poll the HREF provided in the Location field of the response using the duration specified in `Retry-After` until the status is either `done` or `failed`.

```
curl -i -X GET 'https://pce.my-company.com:8443/api/v2/orgs/1/jobs/[href]'
-H 'Accept: application/json' -u $KEY:$TOKEN
```

Async Job Response Properties

The following table defines the properties returned in the response:

Property	Description	Type	Required
`href`	HREF for resource	String	Yes
`job_type`	Query type defined during job creation	String	Yes
`description`	Reference information	String	No
`result`	Query result	Object (HREF, not required)	Yes
`requested_at`	Time PCE received request	Date-time	Yes
`requested_by`	The user who initiated request	Object (HREF, required)	Yes
`terminated_at`	Termination time of job (regardless of outcome)	Date-time	Yes
`status`	Status of async request	Enum `Pending`: Waiting to start `Running`: In progress `Done`: Complete (successful/unsuccessful) `Failed`: Unable to complete (exceeded time limit)	Yes
`created_by`	Creator of request	Object (HREF, required)	Yes

Async Job Status

If the job status is `running`, the response body includes the following results:

```
{
  "href": "/orgs/1/jobs/43f6e9e3-6a68-4481-87c6-18fd096dafbe",
```

```
  "job_type": ":illumio/async_requests",
  "description": "/orgs/1/labels",
  "result": {
  },
  "status": "running",
  "requested_at": "2016-01-14 23:16:52.303166",
  "requested_by": {
    "href": "/users/1"
  }
}
```

Get Async Job Results

The following example demonstrates how to get job results.

URI to Get Async Job Results

```
GET [api_version][org_href]/datafiles/[href]
```

Curl Command to Get Async Job Results

```
curl -i -X GET https://pce.my-company.com:8443/api/v2/orgs/1/datafiles/
[href] -H 'Accept: application/json' -u $KEY:$TOKEN
```

Response Body with Request Results

When the job is complete, use the HREF in the `Result` field to obtain the results:

```
{
  "href": "/orgs/1/jobs/43f6e9e3-6a68-4481-87c6-18fd096dafbe",
  "job_type": ":illumio/async_requests",
  "description": "/orgs/1/labels",
  "result": {
    "href": "/orgs/1/datafiles/[href]"
  },
  "status": "done",
  "requested_at": "2016-01-14 23:16:52.303166",
  "terminated_at": "2016-01-14 23:17:05.223047",
  "requested_by": {
    "href": "/users/1"
  }
}
```

Poll the Query Job Status

After submitting the job request, poll the job using the suggested "`Retry-After`" duration to determine when the job is complete.

The PCE has four possible status options for the job:

- `Pending`: Waiting to start
- `Running`: In progress
- `Done`: Complete (successful/unsuccessful)
- `Failed`: Unable to complete (exceeded time limit)

Get Jobs

Specify the maximum number of jobs to return with the `max_results` query parameter.

Specify the type of job to return with the `job_type` query parameter.

URI to Get the Status of All Jobs

```
GET [api_version]/jobs
```

Curl Command to Get All Job Status

```
curl -i -X GET 'https://pce.my-company.com:8443/api/v2/orgs/1/jobs' -H
'Accept: application/json' -u $KEY:$TOKEN
```

Get a Job

URI to Get the Status of a Job

```
GET [api_version]/jobs/[href]
```

Curl Command to Get a Job Status

```
curl -i -X GET 'https://pce.my-company.com:8443/api/v2/orgs/1/jobs/[href]'
-H 'Accept: application/json' -u $KEY:$TOKEN
```

Response Properties

Poll the HREF provided in the Location field of the response using the duration specified in `Retry-After` until the status is either `"done"` or `""failed"`:

Property	Description	Type	In Results
`href`	HREF for resource	String	Yes
`job_type`	Query type defined during job creation	String	Yes
`description`	Reference information	String	Might not be in results
`result`	Query result	Object (HREF, not required)	Yes
`requested_at`	Time PCE received request	Date-time	Yes
`requested_by`	The user who initiated request	Object (HREF, required)	Yes
`terminated_at`	Termination time of job (regardless of outcome)	Date-time	Yes
`status`	Status of the asynchronous request	Enum (`"done"`, `"pending"`, `"running"`, or `"failed"`)	Yes
`created_by`	Creator of request	Object (HREF, required)	Yes

Response - Updated Job Status

If the job is still running, the response includes a status of `"running"`, as highlighted in blue below:

```
  {
  "href": "/orgs/1/jobs/43f6e9e3-6a68-4481-87c6-18fd096dafbe",
  "job_type": ":illumio/async_requests",
  "description": "/orgs/1/labels",
  "result": {
  },
  "status": "running",
  "requested_at": "2016-01-14 23:16:52.303166",
  "requested_by": {
    "href": "/users/1"
  }
}
```

Delete a Job

URI to Delete a Job

```
DELETE [api_version]/jobs/[href]
```

Curl Command to Delete a Job

```
curl -i -X DELETE 'https://pce.my-company.com:8443/api/v2/orgs/1/jobs/
[href]' -u $KEY:$TOKEN
```

Get the Job Results

This example demonstrates how to get job results after polling job returns a status of `"done"`.

The `uuid` path parameter is required. The `filename` path parameter is optional, it specifies the filename to save the job as.

URI to Get Job Results

```
GET [api_version][org_href]/datafiles/[uuid]
```

Curl Command to Get Job Results

```
curl -i -X GET 'https://yourcompany.com:1234/api/v2/orgs/1/datafiles/
[uuid]' -H 'Accept: application/json' -u $KEY:$TOKEN
```

Response with Results of Request

```
{
  "href": "/orgs/1/jobs/43f6e9e3-6a68-4481-87c6-18fd096dafbe",
  "job_type": ":illumio/async_requests",
  "description": "/orgs/1/labels",
  "result": {
    "href": "/orgs/1/datafiles/[uuid]"
  },
  "status": "done",
  "requested_at": "2016-01-14 23:16:52.303166",
  "terminated_at": "2016-01-14 23:17:05.223047",
  "requested_by": {
    "href": "/users/1"
  }
}
```

PCE Management

As an Illumio administrator, use the APIs listed in this chapter to manage the Policy Compute Engine (PCE).

You can manage many aspects of the PCE through APIs, from authentication and passwords to PCE health.

Product Version

This API returns the current version of the PCE software.

URI to Get Product Version

```
GET [api_version]/product_version
```

Curl Command to Get Product Version

```
curl -i -X GET https://pce.my-company.com:8443/api/v2/product_version -H
"Accept: application/json" -u $KEY:$TOKEN
```

Example Response

The response body has a format similar to this example:

```
{
  "version": "19.3.0",
  "build": 12864,
  "long_display": "19.3.0-12864",
  "short_display": "19.3.0"
}
```

Authentication Settings

This Public Experimental API gets or updates the authentication settings for the login domain (organization).

These new APIs with the included `saml_configs` setting provide customers an option to sign authN requests.

API Methods

HTTP	URI	Functionality
GET	[api_version]/authentication_settings	Get authentication settings
PUT	[api_version]/authentication_settings	Update authentication settings
GET	[api_version]/authentication_settings/saml_configs	Gets all SAML configurations where any_org_owner is authorized to use it. The response now includes the PCE signing certificates that will be used by IdP for the SAML authN request signature validation.
GET	[api_version]/authentication_settings/ saml_configs/:uuid	Get the specified SAML configuration. The response now includes the PCE signing certificates that will be used by IdP for the SAML authN request signature validation.
PUT	[api_version]/authentication_settings/ saml_config/:uuid	Update the specified SAML configuration. API has been enhanced to enable/disable the signing of a SAML authN request.
POST	[api_version]/authentication_settings/ saml_configs/:uuid/pce_signing_cert	Generate a new certificate for signing SAML AuthN requests.

Get Authentication Settings

Curl Command to Get Authentication Settings

The org/:org_id/ path parameter is not specified in this command.

```
curl -i -X GET https://pce.my-company.com:8443/api/v2/
authentication_settings -H "Accept: application/json" -u $KEY:$TOKEN
```

Example Default Response

```
200 OK

{ "authentication_type":"Local" }
```

Update Authentication Settings

Curl Command to Update Authentication Settings

The org/:org_id/ path parameter is not specified in this command.

```
curl -i -X PUT https://pce.my-company.com:8443/api/v2/
authentication_settings/password_policy -H "Content-Type: application/json"
-d '{"authentication_settings": "SAML"}' u $KEY:$TOKEN
```

Request Properties

Parameter	Description	Type	Required
`Local`	Local authentication.	String	No
`SAML`	Authentication with SAML.	String	No

Example Request Body

```
{"authentication_settings": "SAML"}
```

Password Policy

This Public Experimental API gets or updates the domain password policy.

A default password policy is created automatically when a new login domain (organization) is created. There is only one password policy per login domain, so the same password policy applies to all users.

Password Policy Methods

Functionality	HTTP	URI
Get the password policy.	`GET`	`[api_version]/authentication_settings/password_policy`
Update the password policy.	`PUT`	`[api_version]/authentication_settings/password_policy`

Curl Command Get the Password Policy

The `org/:org_id/` path parameter is not specified in this command.

```
curl -i -X GET https://pce.my-company.com:8443/api/v2/
authentication_services/password_policy -H "Accept: application/json" -u
$KEY:$TOKEN
```

Example Default Response: 200 OK

```
{
  "require_type_number": true,
  "require_type_lowercase": true,
  "require_type_uppercase": true,
  "require_type_symbol": false,
  "min_characters_per_type": 1,
  "min_length": 8,
  "min_changed_characters": 1,
  "history_count": 1,
  "expire_time_days": 0,
  "updated_at": "2019-09-20T03:40:00Z",
```

```
  "updated_by": null
}
```

Response Parameters

Parameter	Description	Type	Req
`require_type_number`	If `true`, the password must contain a numerical digit.	Boolean	Yes
`require_type_lowercase`	If `true`, the password must contain a lowercase letter.	Boolean	Yes
`require_type_uppercase`	If `true`, the password must contain an uppercase letter.	Boolean	Yes
`require_type_symbol`	If `true`, the password must contain a symbol, for example: ! @ # $ % ^ * ? \u0026 \u003c \u003e	Boolean	Yes
`min_charac-ters_per_type`	Minimum number of characters for each character type.	Integer	Yes
`min_length`	Minimum password length.	Integer	Yes
`min_changed_characters`	Minimum number of changed characters for a new password. Minimum: 1 Maximum: 4	Integer	Yes
`history_count`	Number of old passwords to remember. Minimum: 1 Maximum: 24	Integer	Yes
`expire_time_days`	Number of days until the password expires. A value of 0 (zero) means the password never expires. Minimum: 0 Maximum: 99	Integer	Yes
`updated_at`	RFC-3339 date-time timestamp of when the password policy was last updated. Automatically recorded by the system.	date-time String	Yes
`updated_by`	The username of the person who last updated this password policy (null for the default password policy). Automatically recorded by the system.	String	Yes

Update Password Policy

Curl Command Update the Password Policy

The `org/:org_id/` path parameter is not specified in this command.

```
curl -i -X PUT https://pce.my-company.com:8443/api/v2/
authentication_services/password_policy -H "Content-Type: application/json"
-u $KEY:$TOKEN -d '{"require_type_symbol": true, "expire_time_days": 90}
```

Parameters

At least three of the four available character types must be true, otherwise a `406 Not Acceptable` error message is returned.*

Parameter	Description	Type	Required
`require_type_number`	If `true`, the password must contain a numerical digit.	Boolean	*
`require_type_lowercase`	If `true`, the password must contain a lowercase letter.	Boolean	*
`require_type_uppercase`	If `true`, the password must contain an uppercase letter.	Boolean	*
`require_type_symbol`	If `true`, the password must contain a symbol, for example: ! @ # $ % ^ * ? \u0026 \u003c \u003e	Boolean	*
`min_characters_per_type`	Minimum number of characters for each character type.	Integer	No
`min_length`	Minimum password length.	Integer	No
`min_changed_characters`	Minimum number of changed characters for new passwords. Minimum: 1 Maximum: 4	Integer	No
`history_count`	Number of old passwords to remember. Minimum: 1 Maximum: 24	Integer	No
`expire_time_days`	Number of days the password expires. A value of 0 (zero) means the password never expires. Minimum: 0 Maximum: 99	Integer	No

Example Request Body

Only the parameters to change must be included in the request body.

```
{
  "require_type_number": true,
  "require_type_lowercase": true,
```

```
  "require_type_uppercase": true,
  "require_type_symbol": true,
  "min_characters_per_type": 1,
  "min_length": 8,
  "min_changed_characters": 1,
  "history_count": 1,
  "expire_time_days": 90
}
```

Supercluster Leader

The Supercluster Leader Public Stable API method checks each PCE in a Supercluster and indicates which PCE is the leader.

Supercluster Leader API

This call is typically made by a customer's Global Server Load Balancer (GSLB) to monitor the health of the leader.

Possible results:

- If the API returns an HTTP 202 response, the cluster where you made this call is the leader.
- If the API returns an HTTP 404 response, the cluster where you made this call is a member.

Get Supercluster Leader

```
GET [api_version]/supercluster/leader
```

Curl Command Get Supercluster Leader

```
curl -X GET 'https://pce.my-company.com:8443/api/v2/supercluster/leader' -i
```

The command is followed by a 200 response:

```
HTTP/1.1 200 OK
    Date:Thu, 08 Apr202 19:21:59 GMT
    Content-Type:application/octet-stream
    Content-Length:0
    Last-Modified: Thu, 08 Apr 0219:21:55 GMT
    ETag: "606f57d3-0"
    Accept-Ranges: bytes
    Cache-Control:private, must-revalidate
    X-Frame-Options: DENY
    X-XSS-Protection:1; mode=block
    X-Content-Type-Options:nosniff

N
```

PCE Health

The Public Stable Health Check API displays health information about a 4X2 Supercluster or a PCE virtual appliance.

NOTE

This API is only available for Illumio Core PCE installed on-premises and is not available for Illumio Cloud customers.

About PCE Health API

With this API, you can see the following health information:

- How long the PCE has been running, its runlevel, and what overall health (normal, warning, or error).
- Each node hostname, IP address, uptime, runlevel, and whether the PCE software is running correctly.
- Each node type (core or data), and which data node is the database replica and the primary database. The replication delay for the database replica is also displayed.
- Information about PCE service alerts, such as the number of degraded or failed services in the cluster, so you can see where service failures have occurred.

PCE Health API Method

Functionality	HTTP	URI
Check the health of the PCE.	`GET`	`[api_version]/health`

Check PCE Health

URI to Check PCE Health

```
GET [api_version]/health
```

Curl Command Check PCE Health

```
curl -i -X GET https://pce.my-company.com:8443/api/v2/health -H 'Accept:
application/json' -u $KEY:'TOKEN'
```

PCE Health Response Properties

Property	Description	Type

`status`	Current health status of the PCE. Possible values:
	
	• `normal`: When a PCE health is a normal state it means:
	  • All required services are running.
	  • All nodes are running.
	  • CPU usage of all nodes is less than 95%.
	  • Memory usage of all nodes is less than 95%.
	  • Disk usage of all nodes is less than 95%.
	  • Database replication lag is less than or equal to 30 seconds.
	• `warning`: When PCE health is in a warning state, it means:
	  • One or more nodes are unreachable.
	  • One or more optional services are missing, or one or more required services have been degraded.
	  • The CPU usage of any node is greater than or equal to 95%.
	  • Memory usage of any node is greater than or equal to 95%.
	  • Disk usage of any node is greater than or equal to 95%.
	  • Database replication lag is greater than 30 seconds.
	
	• `critical`: A PCE is considered to be in a critical state when one or more required services are missing.
	  If a PCE enters a critical state, it might not be possible to authenticate to the PCE or get an API response depending on which services are missing from the PCE.
		String

`type`	The type of PCE: • `standalone`: Indicates that this PCE is an on-premises 2x2 or 4x2 PCE cluster. Or one of the following types: • `leader`: Indicates that this PCE is the leader of a Supercluster. • `member`: Indicates that this PCE is a member of a Supercluster.	String
`fqdn`	The fully qualified domain name (FQDN) of the PCE.	String
`available_seconds`	The length of time that this PCE has been available is measured in seconds.	Number
`notifications`	Health warnings related to the PCE which contain the following properties: • `status`: Severity status of this notification. Possible values include `normal`, `warning`, or `critical`. • `token`: Description of the notification. • `message`: Notification message.	
`listen_only_mode_enabled_at`	Indicates when listen-only mode was enabled for this PCE. For information about enabling or disabling listen-only mode for a PCE, see Listen Only Mode	String

`nodes`	The nodes that comprise your PCE cluster.
	
	For each node of your PCE, this API call returns the following properties:
	
	• `hostname`: The node hostname.
	• `ip_address`: The node IP address.
	• `runlevel`: (Number) The current runlevel of the PCE software on the node.
	• `uptime_seconds`: Seconds since this node has been restarted.
	• `cpu`: Percentage of the node CPU being used.
	  Includes the following two sub-properties:
	  • `status`: Either `normal`, `warning`, or `critical`.
		String

Property	Description	Type
	• `percent`: (Number) Percentage of the node CPU being used. • `disk`: Percentage of the node's disk that is being used. Includes the following two sub-properties: • `status`: Either `normal`, `warning`, or `critical`. • `percent`: (Number) Percentage of the node disk being used. • `memory`: Percentage of the node's memory that is being used. Includes the following two sub-properties: • `status`: Either `normal`, `warning`, or `critical`. • `percent`: (Number) Percentage of the node disk being used. • `services`: The status of all PCE services running on the node. Possible status for PCE services include: • `running`: The service is fully running and operational. • `not running`: The service has stopped running. • `partial`: The service is running but in a partial state. • `optional` • `unknown` • `generated_at`:Timestamp when this information was generated.	
`network`	**PCE 2x2 or 4x2 Deployment** For a PCE 2x2 or 4x2 deployment, the `network`property provides latency information between the database primary and database replica data nodes in your PCE for policy and traffic data. This property also indicates which data node in your PCE is the database primary database and which is the database replica. This `type` of database replication is called `intracluster` in the REST API. Sub-properties include: `replication`: The category of properties that provide database replication latency information for a PCE cluster. (For a PCE Supercluster, this information is provided for each PCE in the Supercluster.) • `type`: Type of replication. `intracluster` for a PCE 2x2 or 4x2 deployment. • `details`: Includes the following properties: • `database_name`: Either `agent` for policy data or `traffic` for traffic data. • `primary_fqdn`: The FQDN of the database primarynode. • `replica_fqdn`: FQDN of the replica database node. • `value`: The amount of replication lag between the primary and database replica for both policy and traffic data. • `status`: Either `normal`, `warning`, or `critical`. • `lag_seconds`: The amount of lag measured in seconds between the primary and replica databases for both policy and traffic data. **Supercluster Deployment** If you have deployed a PCE Supercluster, the PCE health call also returns information about the database replication between the PCE you are currently logged into and all other PCEs in the Supercluster. In a Supercluster deployment, the security policy provisioned on the leader is replicated to all other PCEs in the Supercluster. Additionally, all PCEs in the Supercluster (leader and members) replicate copies of each workload's context, such as IP addresses, to all other PCEs in the Supercluster. This other `type` of database replication for a Supercluster is called `intercluster` in the REST API, and information is provided for all PCEs in the Supercluster. Properties include:	Array

Property	Description	Type

	`replication`: The category of properties that provide database replication latency information for a PCE cluster.
	
	• `type`: Type of replication. `intercluster` for a PCE Supercluster deployment.
	• `details`: Includes the following properties:
	  • `fqdn`: The FQDN of the primary database of the other PCEs listed in this section.
	• `value`: The amount of replication lag between the PCE you are logged into and one of the other PCEs in the Supercluster.
	  • `status`: Either `normal`, `warning`, or `critical`.
	  • `lag_seconds`: The amount of lag measured in seconds between the PCE you are logged into and the other PCE listed in this section.	

`generated_at`	The timestamp of when the information was generated.	String

PCE Health Response

An example response was returned from the PCE Health API.

```
[
    {
        "status": "normal",
        "type": "standalone",
        "fqdn": "pce.mycompany.com",
        "available_seconds": 84133,
        "notifications": [],
        "listen_only_mode_enabled_at": null,
        "nodes": [
            {
                "hostname": "pce_core1.mycompany.com,
                "ip_address": "192.0.1.0",
                "type": "core",
                "runlevel": 5,
                "uptime_seconds": 2051301,
                "cpu": {
                    "status": "normal",
                    "percent": 7
                },
                "disk": [
                    {
                        "location": "disk",
                        "value": {
                            "status": "normal",
                            "percent": 17
                        }
                    }
                ],
                "memory": {
                    "status": "warning",
                    "percent": 85
                },
                "services": {
                    "status": "normal",
                    "services": {
```

```
                        "running": [
                            "agent_background_worker_service",
                            "agent_service",
                            "agent_traffic_service",
                            "auditable_events_service",
                            "collector_service",
                            "ev_service",
                            "executor_service",
                            "fluentd_source_service",
                            "login_service",
                            "memcached",
                            "node_monitor",
                            "search_index_service",
                            "server_load_balancer",
                            "service_discovery_server",
                            "traffic_worker_service",
                            "web_server",
                        ]
                    }
                },
                "generated_at": "2020-03-03T19:38:52+00:00"
            },
            }
        ],
        "network": {
            "replication": [
                {
                    "type": "intracluster",
                    "details": {
                        "database_name": "agent",
                        "primary_fqdn": "bkhorram-qa-6node-v0-pce-1-dbase0"
                    },
                    "value": {
                        "status": "normal",
                        "lag_seconds": 0
                    }
                },
                {
                    "type": "intracluster",
                    "details": {
                        "database_name": "traffic",
                        "primary_fqdn": "bkhorram-qa-6node-v0-pce-1-dbase0"
                    },
                    "value": {
                        "status": "normal",
                        "lag_seconds": 0
                    }
                }
            ]
        },
        "generated_at": "2020-03-03T19:38:52+00:00"
    }
]
```

Node Availability

This Public Stable API method allows the Load Balancer to monitor the health of the PCE core nodes in a 2x2 or 4x2 cluster. This feature is only available if the PCE is deployed as software in your datacenter.

NOTE
This API call does not require authentication.

URI to Check Node Availability

```
GET [api_version]/node_available
```

Check Node Availability

`-X GET` and authentication are not required for this method. The curl `-v` flag provides verbose output.

```
curl -v https://pce.my-company.com:8443/api/v2/node_available
```

Or, you can use `-i -X GET` to return a `200 OK` status if the node is available:

```
curl -i -X GET https://pce.my-company.com:8443/api/v2/node_available
```

Returns `200 OK` if the core node is healthy, and it can see at least one of each service running in the PCE cluster.

Otherwise, it returns a `404` error.

For example, if the PCE is healthy and accessible, the response is `200 OK`.

Health Check from a Load Balancer

In a production deployment, customers run health checks from a Load Balancer. The actual request syntax varies, but here is a sample command for Infoblox:

```
GET /api/v2/node_available HTTP/1.1
```

Support Bundle Requests

Several APIs have been introduced to provide a mechanism to generate a support bundle on each node, including a time range and possibly additional options.

API Methods

Functionality	HTTP	URI
Return the collection of PCE support bundle requests:	`GET`	`[api_version][org_href]/support_bundle_requests`
Return a specific PCE support bundle request:	`GET`	`[api_version][org_href]/support_bundle_requests/:uuid`
Create a PCE support bundle request	`POST`	`[api_version][org_href]/support_bundle_requests`
Delete the PCE support bundle request	`DELETE`	`[api_version][org_href]/support_bundle_requests/:uuid`

Query Parameters

Property	Description	Type	Required
`org_id`	Organization ID	Integer	Yes
`ending_at`	Time at which to exclude entries	String	No
`include_logs`	Set to true if logs are to be included	Boolean	No
`starting_at`	Start date for log filtering	Sring	No
`requested_at`	Time support bundle requested	string(date-time)	Yes

Properties for Support Bundle Requests

Property	Description	Type	Required
`href`	URI of this request Reference to `common/href_object.schema.json`		Yes
`name`	The name of the support bundle	String	Yes
`download_url`	URI of associated report file Reference to `common/href_object.schema.json`		Yes
`requested_at`	Time support bundle requested	String (date-time)	Yes
`completed_at`	Time support bundle completed	String, Null(date-time)	Yes
`status`	A status annunciator indicating the state of this request	String	Yes
`include_logs`	Set to true if logs are to be included	Boolean	Yes
`starting_at`	(GET, POST) Start date for log filtering	String, Null(date-time)	Yes
`ending_at`	End date for log filtering	String, Null(date-time)	Yes

Example for POST

```
{
    "include_logs": true,
    "starting_at": null,
    "ending_at": null
}
```

No Op Public Stable API

The No Op Public Stable API calls the PCE without performing any operations. This API is used to check connectivity to and from the PCE.

Use this API to verify that new authentication credentials are working after creating a new set of keys.

URI for No Op

```
GET [api_version]/noop
```

Curl Command for No Op

```
curl -i -X GET https://pce.my-company.com:8443/api/v2/noop -H "Accept:
application/json" -u $KEY:'TOKEN'
```

Node Availability

This Public Stable API method allows the Load Balancer to monitor the health of the PCE core nodes in a 2x2 or 4x2 cluster. This feature is only available if the PCE is deployed as software in your data center.

NOTE

This API call does not require authentication.

URI to Check Node Availability

```
GET [api_version]/node_available
```

Support Bundle Requests

Several APIs have been introduced to provide a mechanism to generate a support bundle on each node, including a time range and possibly additional options.

API Methods

Functionality	HTTP	URI
Return the collection of PCE support bundle requests:	GET	[api_version][org_href]/support_bundle_requests
Return a specific PCE support bundle request:	GET	[api_version][org_href]/support_bundle_requests/:uuid
Create a PCE support bundle request.	POST	[api_version][org_href]/support_bundle_requests
Delete the PCE support bundle request.	DELETE	[api_version][org_href]/support_bundle_requests/:uuid

Health Check from a Load Balancer

In a production deployment, customers run health checks from a Load Balancer. The actual request syntax varies, but here is a sample command for Infoblox:

```
GET /api/v2/node_available HTTP/1.1
```

Events

This Public Experimental API gets a collection of events or an individual event.

NOTE

Use this Events API instead of Audit Events.

Events include logging a user in or out of the PCE, granting a user a role, pairing or unpairing a workload, and creating a label, ruleset, or IP list.

Event Types

For a complete list of JSON events, descriptions, CEF/LEEF success events, and CEF/LEEF failure events, see List of Event Types [318].

Event API Methods

Functionality	HTTP	URI
Get a collection of events.	`GET`	`[api_version][org_href]/events`
Get an individual event.	`GET`	`[api_version][event_href]`

Get Events

This API gets a collection of events or a specific event identified by an event ID (in the form of a UUID).

Get Events Collection

When getting a collection of events, be aware of the following caveats:

- Use the `max_results` query parameter to increase the maximum number of events returned.
- The largest value accepted for `max_results` is 10000. To return more than 10000 events, use Asynchronous GET Collection.

URI to Get a Collection of Events

```
GET [api_version][org_href]/events
```

URI to Get an Individual Event

```
GET [api_version][event_href]
```

Container Clusters

The Illumio Core uses three groups of APIs to manage container clusters:

- Container Cluster API (GET, POST, PUT, DELETE)
- Container Cluster Workload Profiles API (GET, POST, PUT, DELETE)
- Container Cluster Service Backend API (GET)

Container Cluster API

A container cluster object is used to store all the information about a Kubernetes cluster in the PCE by collecting telemetry from Kubelink. Each Kubernetes cluster maps to one container cluster object in the PCE.

Use these methods to get, create, update, or delete container clusters:

Functionality	HTTP	URI
Get the list of container clusters	`GET`	`[api_version][org_href]/container_clusters`
Get the specified container cluster	`GET`	`[api_version][org_href]/container_clusters/:uuid`
Create a container cluster	`POST`	`[api_version][org_href]/container_clusters`
Update the specified container cluster	`PUT`	`[api_version][org_href]/container_clusters/:uuid`
Delete the specified container cluster	`DELETE`	`[api_version][org_href]/container_clusters/:uuid`

Query Parameters for the GET Method

Use the following required and optional parameters:

Parameter	Description	Type	Required
`href`	URI of the container cluster.	String	Yes
`name`	User assigned name of the container cluster.	String	Yes
`description`	User-assigned description of the container cluster.	String	Yes
`nodes`		Array	No
`machine_id`	This parameter has the following property:	Object	Yes
	• `pod_subnet`: The pod subnet	String	
`manager_type`	Manager of the container cluster (and version).	String	No
`network_type`	Type of network.	String	No
`last_connected`	Date-time format.	String	No
`online`	Online: true/false.	Boolean	No
`errors`	The object `error_type` has the following properties:	Array	No
	• `audit_event`: • `href` • `duplicate_ids` • `error_type`	Object String Array String String	
`kubelink_version`	Kubelink software version.	String	No
`pce_fqdn`	PCE FQDN for this container cluster; used only in Supercluster.	String	No
`cluster_mode`	The new property `cluster_mode` was added in 23.5.10 to describe the cluster mode for container cluster:	String	

Query Parameters for the POST and PUT Methods

Use the following parameters:

Parameter	Description	Type	Required
`name`	User-assigned name of the cluster	String	Yes
`description`	User-assigned description of the cluster	String	No

Curl Examples and Responses

Curl Command for GET

```
curl --request GET --url https://pce.my-company.com:8443/api/v2/orgs/1/
container_clusters --header 'authorization: Basic
YXBpXzE2YjBkYjI0MjJhZGNkYWU5OjA5ZmRjNjA4MDhiMzExZTc2Y2UyNzNmOWNiN2ZhMTA5OTdk
MWNlMDAzZmMzOTQ1ZGMxYzEwZGzlmZjM=='
```

Example Response for GET

```
[
  {
   "href":"/orgs/1/container_clusters/
445bfa9b-4de4-4c09-9705-496eb04b190f",
    "pce_fqdn":null,
    "name":"k8s2",
    "description":"",
    "manager_type":"Kubernetes v1.16.2",
    "last_connected":"2019-10-28T22:48:31.228Z",
    "kubelink_version":"2.0.0-master.96e58b",
    "online":true,
    "nodes":
       [
        {
      "name":"node1",
      "pod_subnet":"10.233.64.0/24"
       },
      {
       "name":"node2",
      "pod_subnet":"10.233.65.0/24"
          },
     {
      "name":"node3",
      "pod_subnet":"10.233.66.0/24"
      }
       ],
    "errors":[]
      },
 {
   "href":"/orgs/1/container_clusters/ad678193-8e2f-402b-
a864-4947dcc0c6d7",
    "pce_fqdn":null,
    "name":"Openshift 3.11",
    "description":"",
    "manager_type":"Openshift v3.11.43",
    "last_connected":"2019-10-28T22:50:30.201Z",
    "kubelink_version":"1.0.0-master.a81280",
    "online":true,
    "nodes":
        [
        {
        "name":"ip-172-31-19-198.us-west-2.compute.internal",
        "pod_subnet":"10.128.0.0/23"
        },
       {
        "name":"ip-172-31-20-168.us-west-2.compute.internal",
        "pod_subnet":"10.131.0.0/23"
        },
```

```
        {
         "name":"ip-172-31-22-56.us-west-2.compute.internal",
         "pod_subnet":"10.130.0.0/23"
         },
        {
         "name":"ip-172-31-27-241.us-west-2.compute.internal",
         "pod_subnet":"10.129.0.0/23"
         }
    ],
    "errors":[]
       },
  {
   "href": "/orgs/1/container_clusters/bef57e90-97d4-4744-
a129-5d35aa12b21b",
    "pce_fqdn":null,
    "name":"k8s3 Cluster",
    "description":"Flannel Vx Lan",
    "manager_type":"Kubernetes v1.13.2",
    "last_connected":"2019-10-28T22:47:59.122Z",
    "kubelink_version":"EYE-60264",
    "online":true,
    "nodes":
     [
       {
        "name":"k8s3master",
        "pod_subnet":"10.244.0.0/24"
        },
          {
        "name":"k8s3minion1",
        "pod_subnet":"10.244.2.0/24"
        },
       {
        "name":"k8s3minion2",
        "pod_subnet":"10.244.1.0/24"
        }
    ],
    "errors":[]
      },
  {
   "href":"/orgs/1/container_clusters/d7d62400-7650-4407-ae9b-71803dbb1324",
    "pce_fqdn":null,
    "name":"k8s1 v4",
    "description":"",
    "manager_type":"Kubernetes v1.12.4",
    "last_connected":"2019-10-24T23:58:55.795Z",
    "kubelink_version":"EYE-61567",
    "online":false,
    "nodes":
      [
       {
        "name":"k8s1master",
        "pod_subnet":"10.244.0.0/24"
         },
       {
        "name":"k8s1minion1",
```

```
        "pod_subnet":"10.244.2.0/24"
        },
       {
        "name":"k8s1minion2",
        "pod_subnet":"10.244.1.0/24"
        }
        ],
     "errors":[]
    }
]
```

Curl Example for POST

```
curl --request POST --url https://pce.my-company.com:8443/api/v2/orgs/1/
container_clusters --header 'authorization: Basic
jI0MjJhZGNkYWU5OjA5ZmRjNjA4MDhiMzExZTc2Y2UyNzNmOWNiN2ZhMTA5OTdkMWNlMDAzZmMzO
TQ1ZGMxYzEwZGJhZTg5NzlmZjM=' --header 'content-type: application/json' --
data '{"name": "test","description": "test"}'
```

Curl Example for PUT

```
curl --request PUT --url https://pce.my-company.com:8443/api/v2/orgs/1/
container_clusters/1b851d4b-f22d-47be-b744-f3c2dca490a0 --header
'authorization: Basic
YXBpXzE2YjBkYjI0MjJhZGNkYWU5OjA5ZmRjNjA4MDhiMzExZTc2Y2UyNzNmOWNiN2ZhMTA5OTdk
MWNlMDAzZmMzOTQ1ZGMxYzEwZGJhZTg5NzlmZjM=' --header 'content-type:
application/json' --data '{"name": "test","description": "test"}'
```

Example Response for POST

```
{
    "href": "/orgs/1/container_clusters/1b851d4b-f22d-47be-b744-
f3c2dca490a0",
        "pce_fqdn": null,
        "name": "test",
        "description": "test",
        "manager_type": null,
        "last_connected": null,
        "kubelink_version": null,
        "online": false,
        "nodes": [],
        "errors": [],
        "container_cluster_token":
"1_0dfec0acb8e4bc53e052874874da0c24e7ac98da3b3954e3c9ea6f9860722e84"
}
```

Container Cluster Workload Profiles

When you install an Illumio VEN on a container cluster, all pods in the container cluster are unmanaged or not visible in the PCE. However, all namespaces that exist on the container clusters are reported by Kubelink and made visible via the Container Container Workload Profiles API.

Each container workload profile maps to a Kubernetes namespace and can be either managed or unmanaged. The default state for a profile is unmanaged.

Use these methods to get, create, update, or delete container cluster workload profiles:

Functionality	HTTP	URI
Get the list of container cluster workload profiles	`GET`	`GET /orgs/:xorg_id/container_clusters/: container_cluster_id/container_workload_ profiles`
Create container cluster workload profiles	`POST`	`POST /orgs/:xorg_id/container_clusters/: container_cluster_id/container_workload_ profiles`
Update the specified container cluster workload profile	`PUT`	`PUT /orgs/:xorg_id/container_clusters/: container_cluster_id/container_workload_ profiles/:container_workload_profile_id`
Supports the UI feature for bulk update of container workload profiles	`PUT`	`PUT /orgs/:xorg_id/container_clusters/: container_cluster_id/container_workload_ profiles_update`
Delete the specified container cluster workload profile	`DELETE`	`DELETE /orgs/:xorg_id/container_clusters/: container_cluster_id/container_workload_ profiles/:container_workload_profile_id`

Query Parameters for Container Workload Methods

Parameter	Description	Type	Required
`org_id`	Organization ID	Integer	Yes
`container_cluster_id`	Cluster UUID	String	Yes
`assign_labels`	(GET) List of lists of label URIs, encoded as a JSON string	String	No
	(POST, PUT) Assigned labels		No
`enforcement_mode`	(GET) Filter by enforcement mode.	String	No
	(PUT) workload enforcement mode		No
`linked`	Filter by linked container workload profiles.	Boolean	No
`managed`	Filter by managed state	Boolean	No
`max_results`	Maximum number of container workloads to return..	Integer	No
`name`	(GET) Name string to match. Supports partial matches.	String	No
	(POST) A friendly name given to a profile if the namespace is not user friendly		YES
`namespace`	Namespace string to match. Supports partial matches.	String	No
`visibility_level`	Filter by visibility level	String	No

Response Properties for Container Workload Methods

Parameter	Description	Type
`href`	`Container Workload Profile URI`	String
`enforcement_mode`	Reference to `common/workload_enforcement_mode.schema.json`	
`managed`	If the namespace is managed or not	Boolean
`max_results`	Maximum number of container workloads to return..	Integer
`name`	A friendly name given to a profile if the namespace is not user friendly	String, Null
`namespace`	Namespace name	String, Null
`container_workload_profile_id`	Container workload profile UUID	String
`labels`	Labels to assign to the workload that matches the namespace. Reference to `common/label_restrictions.schema.json`	

Curl Examples and Responses

Curl example for GET

```
curl --request GET --url https://pce.my-company.com:8443/api/v2/orgs/1/
containermeters iun one table and verified with the Quick
Reference._clusters/445bfa9b-4de4-4c09-9705-496eb04b190f/
container_workload_profiles --header 'authorization: Basic
NjA4MDhiMzExZTc2Y2UyNzNmOWNiN2ZhMTA5OTdkMWNlMDAzZmMzOTQ1ZGMxYzEwZGJhZTg5Nzlm
ZjM=' --header 'content-type: application/json'
```

Curl Example for POST

```
curl --request POST --url https://pce.my-company.com:8443/api/v2/orgs/1/
container_clusters/445bfa9b-4de4-4c09-9705-496eb04b190f/
container_workload_profiles --header 'authorization: Basic
A5ZmRjNjA4MDhiMzExZTc2Y2UyNzNmOWNiN2ZhMTA5OTdkMWNlMDAzZmMzOTQ1ZGMxYzEwZGJhZT
g5NzlmZjM=' --header 'content-type: application/json' --data '{"name":
"test","description": "test","assign_labels": [{"href": "/orgs/1/labels/
1"}],"mode": "full","log_traffic": true}'
```

Curl Example for PUT

```
curl --request PUT --url https://pce.my-company.com:8443/api/v2/orgs/1/
container_clusters/445bfa9b-4de4-4c09-9705-496eb04b190f/
container_workload_profiles/219b49c3-3bb5-4fc0-9913-b76398105e35 --header
'authorization: Basic
mRjNjA4MDhiMzExZTc2Y2UyNzNmOWNiN2ZhMTA5OTdkMWNlMDAzZmMzOTQ1ZGMxYzEwZGJhZTg5N
zlmZjM=' --header 'content-type: application/json' --data '{"name":
"test","description": "test","assign_labels": [{"href": "/orgs/1/labels/
1"}],"mode": "full","log_traffic": true}'
```

Example Response for GET

```
[
    {

"href": "/orgs/10/container_clusters/974aec34-e8e7-478d-9ca2-90ebb3642edc/
container_workload_profiles/5454cc84-d6be-4e6c-ac62-465f9504fac0",
        "namespace": "openshift-host-network",
        "enforcement_mode": "visibility_only",
        "visibility_level": "flow_summary",
        "managed": true,
        "assign_labels": [
            {
                "href": "/orgs/10/labels/128"
            },
            {
                "href": "/orgs/10/labels/225"
            }
        ],
        "labels": [
            {
                "key": "loc",
                "assignment": {
                    "href": "/orgs/10/labels/128",
                     "value": "AWS"
                }
            },
            {
                "key": "env",
                "assignment": {
                    "href": "/orgs/10/labels/225",
                    "value": "OCP4.6"
                }
        }
    ],
        "linked": true,
        "created_at": "2021-08-25T18:11:52.665Z",
        "created_by": {
             "href": "/orgs/10/container_clusters/974aec34-
e8e7-478d-9ca2-90ebb3642edc"
        },
        "updated_at": "2021-08-25T18:11:52.665Z",
        "updated_by": {
            "href": "/orgs/10/container_clusters/974aec34-
e8e7-478d-9ca2-90ebb3642edc"
        }
    }

]
```


Examples for container_workload_profiles/update

Example Request


```
{
    "container_workload_profiles": [
    {
        "href": "url_to_some_container_workload_profile"
```

```
        },
        {
        "href": "url_to_other_container_workload_profile"
    }
    ],
    "labels": [
    {
        "key": "role",
        "assignment": {
        "href": "url_to_label"
        }
    }
    ],
    "enforcement_mode": 2,
        "visibility_level": "flow_summary",
        "managed": true
}
```

Example Response

- For success: Response code 204; Response body: none
- If an error occurred on any of the input records:
  - Response code 406;
  - Response body:

```
[
    {
    "token": "input_validation_error",
    "message": "....., record_index=>1, ...,
unmanaged_container_workload_profile_labels, ..."
                # message contains index of failed record and specific
error message
    },
    ...
]
```

Label Restrictions

Kubernetes pods and services running in a namespace (Kubernetes) or project (OpenShift) must be labeled (RAEL) to be included in policy within Illumio Core. The container workload profile defines how labels will be assigned to pods and services within a namespace.

Illumio labels can be statically assigned from the PCE or defined in the Kubernetes manifest files using annotations. For each label key (RAEL), the PCE administrator can define four options:

1. No label will be assigned.
2. One label will be assigned from PCE.
3. A restricted list of labels can be assigned from Kubernetes using annotations. Label restrictions prevent misuse of Illumio labels by the people managing the Kubernetes platform and makes sure the labels inherit the policy they should be receiving.
4. Any label can be assigned from Kubernetes.

You can set role labels for the following APIs:

- `PUT /api/v2/orgs/:xorg_id/container_clusters/<:cluster_id>/container_workload_profiles`
- `POST /api/v2/orgs/:xorg_id/container_clusters/<:cluster_id>/container_workload_profiles`

Examples

Set an empty Role label

```
{
    "labels": [
        {"key": "role", "assign": {} }
    ]
}
```

Set a Location label

```
PUT /api/v2/orgs/1/container_clusters/65d1f197-938a-49ef-9343-6f55ec76fd90/
container_workload_profiles/afe4661a-03ef-462f-ada6-ce7334aa9704

{
    "labels": [
        { "key": "loc", "restriction": {"href": "/orgs/1/labels/221"} }
    ]
}
```

Set an allow list for the Environment label

Allow a list of Environment labels to be assigned using Kubernetes:

```
PUT /api/v2/orgs/1/container_clusters/65d1f197-938a-49ef-9343-6f55ec76fd90/
container_workload_profiles/afe4661a-03ef-462f-ada6-ce7334aa9704

{
    "labels": [
        { "key": "env", "restriction": [{"href": "/orgs/1/labels/176"},
{"href": "/orgs/1/labels/302"}, {"href": "/orgs/1/labels/303"}] }
    ]
}
```

Allow any value for the Application label

```
PUT /api/v2/orgs/1/container_clusters/65d1f197-938a-49ef-9343-6f55ec76fd90/
container_workload_profiles/afe4661a-03ef-462f-ada6-ce7334aa9704

{
    "labels": [
        { "key": "app", "restriction": [] }
    ]
}
```

Multiple ways to assign or allow labels used together in one Container Workload Profile

```
PUT /api/v2/orgs/1/container_clusters/65d1f197-938a-49ef-9343-6f55ec76fd90/
container_workload_profiles/afe4661a-03ef-462f-ada6-ce7334aa9704

{
    "labels": [
        {"key": "role", "assign": {} },
        {"key": "app", "restriction": [] },
        {"key": "env", "restriction": [{"href": "/orgs/1/labels/176"},
{"href": "/orgs/1/labels/302"}, {"href": "/orgs/1/labels/303"}] },
        {"key": "loc", "assign": {"href": "/orgs/1/labels/221"} }
    ]
}
```

Result for the above example:

- `role`: No label will be set; it is an explicit statement (you don't want a `role` label to be assigned).
- `app`: Any value can be set in the annotations for the `app` label key (provided the value exists in PCE).
- `env`: Only the values specified in the allowlist can be set in the annotations for the `env` label key.
- `loc`: The value of the `loc` label key is assigned to the value defined in the payload.

Label Assignment Configuration

To clear the label assignment option and go back to the default option (any labels passed at runtime using Kubernetes annotations will be allowed), 2 options:

Option 1: explicit statement

```
{
    "labels": [
        { "key": "role", "restriction": [] }
    ]
}
```

Option 2: empty payload

```
{
    "labels": []
}
```

Backend Services Associated with Container Clusters

Kubernetes services are represented as virtual services in the Illumio policy model. For the services in Kubernetes, Kubelink creates virtual services in the PCE and reports the list of Replication Controllers, DaemonSets, and ReplicaSets responsible for managing the pods that support the services.

When there is a match between the Replication Controller and ReplicaSet managing a pod, the PCE creates a binding between the virtual service and the container workload.

The Service Backend represents a match between a virtual service and an application type, such as Deployment or ReplicaSet.

Use this method to get the service backend:

Functionality	HTTP	URI
Get data about the service backend	GET	GET /orgs/1/container_clusters/:container_cluster_id/service_backends

Properties for Backend Services

Parameters	Description	Type	Required
name	The name of the container cluster backend.	String	Yes
kind	The type (or kind) of the container cluster backend.	String	Yes
updated_at	The time (rfc339 timestamp) at which the container cluster backend was updated.	String	Yes
created_at	The time (rfc339 timestamp) at which the container cluster backend was created.	String	Yes
virtual_services	Includes the following properties:	Object	Yes
	• href:The URI to the associated virtual service • name: The virtual service name	String String	

Curl Examples

Curl Example for GET

```
curl --request GET --url https://pce.my-company.com:8443/api/v2/orgs/1/
container_clusters/445bfa9b-4de4-4c09-9705-496eb04b190f/service_backends --
header 'authorization: Basic
YzE2YjBkYjI0MjJhZGNkYWU5OjA5ZmRjNjA4MDhiMzExZTc2Y2UyNzNmOWNiN2ZhMTA5OTdkMWNl
MDAzZmMzOTQ1ZGMxYzEwZGJhZTg5NzlmZjM='
```

Example Response for GET

```
[
    {
        "name": "58687784f9",
        "kind": "replicasethash",
        "namespace": "kube-system",
        "updated_at": "2020-10-25T20:07:39.741Z",
        "created_at": "2020-10-25T20:07:39.741Z",
        "virtual_service": {
        "href": "/orgs/1/sec_policy/draft/virtual_services/926c2f63-
bcd8-42f1-8811-165b34f84334",
        "name": "coredns-k8s2-kube-system"
        }
    },
    {
        "name": "556b9ff8f8",
```

```
        "kind": "replicasethash",
        "namespace": "kube-system",
        "updated_at": "2020-10-25T20:07:39.768Z",
        "created_at": "2020-10-25T20:07:39.768Z",
        "virtual_service": {
        "href": "/orgs/1/sec_policy/draft/virtual_services/
58b0df03-1151-464e-8352-069e3ad0d7ed",
        "name": "kubernetes-dashboard-k8s2-kube-system"
        }
    }
]
```

Kubernetes APIs

Kubernetes Workload Endpoints

Customers have been requiring to see the details of Kubernetes workloads in PCE so that they can write policies and troubleshoot any issues.

Two new endpoints have been created for Kubernetes workloads:

`GET /api/v2/orgs/:xorg_id/kubernetes_workloads`

This API lists all new Kubernetes Workloads in separate tab/page with separate sorts and filters.

It contains required properties such as `name`, `kind`, `namespace`,

as well as optional properties `href`, `labels`, `enforcement_mode`,`visibility_level`, `container_workload_profile`, `container_cluster`, `security_policy_applied_at`, `security_policy_sync_state`, `created_at`, `k8s_label`, and `k8s_annotations`.

```
{
    "$schema": "http://json-schema.org/draft-04/schema#",
    "type": "object",
    "required": [
        "name",
        "kind",
        "namespace"
    ],
    "properties": {
        "href": {
            "description": "URI of the container workload",
            "type": "string"
        },
        "name": {
            "description": "Container workload name",
            "type": "string"
        },
        "namespace": {
            "description": "k8s namespace where this k8s Workload belongs
to",
            "type": "string"
```

```
        },
        "kind": {
            "description": "k8s resource kind, e.g. Deployment",
            "type": "string"
        },
        "labels": {
            "type": "array",
            "items": {
            "$ref": "../common/label_optional_key_value.schema.json"
           }
        },
        "enforcement_mode": {
            "$ref": "../common/workload_enforcement_mode.schema.json"
        },
        "visibility_level": {
            "$ref": "../common/workload_visibility_level.schema.json"
        },
        "container_workload_profile": {
            "$ref":
"container_clusters_container_workload_profiles_get.schema.json"
        },
        "container_cluster": {
            "$ref": "container_clusters_get.schema.json"
        },
        "security_policy_applied_at": {
            "description": "Last reported time when policy was processed by
CLAS to the k8s workload (UTC)",
            "type": [
             "string",
             "null"
            ],
            "format": "date-time"
        },
        "security_policy_sync_state": {
            "description": "Current state of security policy",
               "type": "string"
        },
        "created_at": {
            "description": "RFC 3339 timestamp at which this record was
created",
            "format": "date-time",
            "type": "string"
        },
        "updated_at": {
            "description": "RFC 3339 timestamp at which this record was
updated",
            "format": "date-time",
            "type": "string"
        },
        "k8s_labels": {
            "type": "array",
            "items": {
            "type": "object",
            "required": [
               "key",
```

```
                "value"
            ],
            "properties": {
                "key": {
                "type": "string"
            },
            "value": {
            "type": "string"
            }
                    }
               }
        },
        "k8s_annotations": {
            "type": "array",
            "items": {
            "type": "object",
            "required": [
                "key",
                "value"
            ],
            "properties": {
                "key": {
                "type": "string"
            },
            "value": {
                "type": "string"
            }
            }
        }
        }
    }
}
```

For this API, these changes have been made in release 23.5.0:

- two arrays have been removed, `k8s_labels` and s`k8s_annotation`, and replaced with the property `metadata`

```
    "metadata": {
        "$ref": "
        ../common/kubernetes_workloads_metadata.schema.json"
```

- HREF description has been changed from `URI of the container workload`, to `URI of the kubernetes workload`.

`GET /api/v2/orgs/:xorg_id/kubernetes_workloads/:kubernetes_workload_uuid`

This API provides a detailed page for the specified Kubernetes workload with custom K8S attributes.

`common non_empty_label_scopes.schema.json`

This new common schema provides a collection of assigned list of labels. Minimum number is one.

```
{
    "$schema": "http://json-schema.org/draft-04/schema#",
    "description": "Collection of assigned list of labels",
    "type": "array",
    "items": {
        "$ref": "labels.schema.json",
        "minItems": 1
    },
    "uniqueItems": true,
    "minItems": 1
}
```

common kubernetes_workloads_metadata

The new common schema `kubernetes_workloads_metadata` was added in release 23.5.0 that is referenced from `kubernetes_workload_get`.

It provides Kubernetes properties such as labels, annotations, and external service's UID.

```
{
    "$schema": "http://json-schema.org/draft-04/schema#",
    "description": "k8s object metadata",
    "additionalProperties": false,
    "type": "object",
    "properties": {
    "labels": {
       "description": "k8s key/value pairs attached to object that specify
identifying attributes",
       "type": "object"
           },
    "annotations": {
       "description": "k8s key/value pairs representing arbitrary non-
identifying metadata of object",
       "type": "object"
       },
    "external_service_uid": {
       "description": "k8s object uid of external traffic service (NodePort
or LoadBalancer)",
        "type": "string"
          }
     }
}
```

For more information, see Kubernetes Openshift Guideguide.

Access Restrictions and Trusted Proxy IPs

To employ automation for managing the PCE environment, you can use API Keys created by an admin user to automate the PCE management tasks. Illumio provides a way to restrict the usage of these API keys by IP address so that you can block API requests coming in from non-allowed IP addresses.

Access Restrictions

Access restrictions are configurable entities and contain up to 8 IPv4 IP addresses or CIDR blocks that specify the source IP addresses of the allowed clients. Only the global Org Owner can manage access restrictions in the organization, while other roles can neither edit nor view them.

The following rules apply to access restrictions:

- Each access restriction can be applied to either one or both:
  - API requests authenticated by API keys
  - API requests authenticated by `Username/Password` credentials
- The global Org Owners can edit an access restriction after it has been created by modifying the allowed IP list or the options. They can also assign access restrictions to Local and External Users. The API supports updating access restrictions for a list of users.
- Access restrictions are leader-owned configuration objects that are replicated to all super-cluster regions.
- Access restrictions are enforced as follows:
  - To enforce an API request, determine the user account for that API request using the API key or the user session token and then find the access restriction that is configured for that user. If no access restriction is assigned to the user, the API request proceeds.
  - If the client IP address for an API request does not satisfy the corresponding user's access restrictions, the request is rejected with a 401 error message.
  - Access restrictions are not enforced on some URLs (node_available, static JS/CSS content).
- When a request is rejected due to unsatisfied access restrictions, it generates an Event that specifies a failure caused by an invalid source IP address, including the actual IP address and an appropriate error code (403).

Assignment to Users

Each Access Restriction is a configuration object that specifies a set of allow-list IP addresses or CIDR blocks, designating the allowed client IP address. It also specifies the restricted API access types (those authenticated by API Keys or those authenticated by user session tokens).

The Org Owners create and manage access restrictions in their organizations so that there are a maximum of 50 access restrictions per organization. The Org Owners can assign a single access restriction to each Local or External User (by default, a user has no access restriction assigned).

Access Restriction Methods

Functionality	HTTP	URI
Get a list of access restrictions.	`GET`	`/api/v2/orgs/<org_id>/access_restrictions`
Get a specific access restriction.	`Get`	`/api/v2/orgs/<org_id>/access_restrictions/<id>`
Create an access restriction.	`POST`	`/api/v2/orgs/<org_id>/access_restrictions`
Update an access restriction. Same schema as `POST`, but fields such as `name` or`ips` might not be required.	`PUT`	`/api/v2/orgs/<org_id>/access_restrictions/<id>`
The `DELETE` endpoint should return an error if the specified `access_restriction` is referenced by any User or Group. The existing `access_restrictions` from all Users and Groups must be removed before they can be deleted.	`DELETE`	`/api/v2/orgs/<org_id>/access_restrictions/<id>`

Return Values for Access Restriction

These are the return values for the Access Restriction methods:

Property	Method	Description	Required
`href`	`GET`	URI of access restriction	Yes
`name`	`GET, POST`,	User-assigned name of the access restriction	`(No GET)(Yes POST)`
`description`	`GET, POST`	User-assigned description of the access restriction	No
`ips`	`GET, POST`	Array of ip addresses or CIDR blocks	Yes
`enforcement_exclusions`	`GET, POST`	The types of API access methods that are excluded from access restriction enforcement	No

Manage Access Restrictions

Create an Access Restrictions

```
curl -i -X POST https://pce.my-company.com:8443/api/v2/orgs/1/
access_restrictions/
```

Response

```
{
    "name": "sample Access Restriction payload",
    "description": "example",
    "ips": [ "192.168.33.1/16" ],
    "enforcement_exclusions": [ "user_sessions" ]
}
```

Read an Access Restriction

```
curl -i -X GET https://pce.my-company.com:8443/api/v2/orgs/1/
access_restrictions/
```

Update an Access Restriction

```
curl -i -X PUT https://pce.my-company.com:8443/api/v2/orgs/1/
access_restrictions/1

{
    "name": "modified Access Restriction payload",
    "description": "example",
    "ips": [ "192.168.33.1/16" ],
    "enforcement_exclusions": [ "user_sessions" ]
}
```

Delete the Access Restriction

```
curl -i -X DELETE https://pce.my-company.com:8443/api/v2/orgs/1/
access_restrictions/1
```

Curl Command to associate an Access Restriction with an Org Auth Sec Principal (PUT)

```
curl -i -X -PUT https://pce.my-company.com:8443/api/v2/orgs/1/
auth_security_principals/76a0607b-6961-4c74-a98a-8b10775c8a9b

{
    "name": "test.user@illumio.com",
    "display_name": "test",
    "type": "user",
    "access_restriction": {
    "href": "/orgs/1/access_restrictions/1"
}
}
```

Trusted Proxy IPs

When a client is connected to the PCE haproxy server, this connection can traverse one or more load balancers or proxies. Therefore, the source IP address of a client connection to haproxy might not be the actual public IP address of the client.

Proxies and intermediaries often use the `X-Forwarded-For` header (and other custom headers, like X-Client-IP) to pass along the client IP address. The value of this header is a comma-separated list of one or more IP addresses, where the source IP address seen by the most recent proxy is at the end of the list.

The client IP address used for API requests and Web UI connections comes from the value of the `X-Forwarded-For` header that haproxy sets on the back-end request to the web service. It is set to one of these values:

- Value of the `X-Forwarded-For` header on the incoming request (when `trust_upstream_x_forwarded_for` is `true`)
- Source IP address of the client connection to haproxy (when `trust_upstream_x_forwarded_for` is `false`)

Configurable trusted proxy IPs allow Org Owners to configure a list of IPv4 addresses or CIDR blocks that are considered trusted for setting a client's `X-Forwarded-For` header. Using this setting, the Org Owner can designate the trusted proxies/intermediaries, and the PCE will consider all others untrusted when setting the `X-Forwarded-For` header.

The haproxy is configured to always put the client's source IP address in the `X-Real-IP` header on the back-end request and to pass along any `X-Forwarded-For` headers in the front-end request.

Trusted Proxy IP Methods

Functionality	HTTP	URI
Get a list of trusted IP proxies	`GET`	`/api/v2/orgs/<org_id>/settings/trusted_proxy_ips`
Interservice API for fetching an orgs' `trusted_proxy_ips` settings, so that it may be cached locally. It uses the same schema as the GET endpoint above; it receives the org_id as a quer input	`GET`	`/api/v2/org_trusted_proxy_ips?org_id=<id>`
Update `trusted_proxy_ips` settings for a given org, with the same schema as the GET endpoint (except without the `max_trusted_proxy_ips_per_region` property)	`PUT`	`/api/v2/orgs/<org_id>/settings/trusted_proxy_ips`

Trusted Proxy IPs

These are the return values for the Trusted Proxy methods:

Parameter	Method	Description	Req
`max_trusted_proxy_ips_per_region`	`GET`	Maximum number of Trusted Proxy IPs allowed for each PCE	Yes
`trusted_proxy_ips`	`GET, PUT`	IPs or CIDRs trusted (per-region) for handling clients' X-Forwarded-For header; Required: `pce_fqdn`: FQDN of PCE region, or null if not in super-cluster `ip`:IP address or CIDR trusted for handling the clients' header X-Forwarded-For	Yes

Manage Trusted Proxy IPs

Read a Trusted Proxy IP

```
curl -i -X GET https://pce.my-company.com:8443/api/v2/orgs/1/
access_restrictions/
```

Update a Trusted Proxy IP

```
curl -i -X PUT https://pce.my-company.com:8443/api/v2/orgs/1/settings/
trusted_proxy_ips/
```

```
{
    "trusted_proxy_ips": [
        {
            "pce_fqdn": null,
            "ip": "66.151.147.0/24"
        },
        {
            "pce_fqdn": null,
            "ip": "192.168.34.0/24"
        }
    ]
}
```

Organization Access

Changes to the organization access introduced a new common schema:

common ipv4_ipv6_subnet

```
{
    "$schema": "http://json-schema.org/draft-04/schema#",
    "type": "string",
    "oneOf": [
        { "format": "ipv4" },
        { "format": "ipv6" }
    ]
}
```

This common schema is replacing the one that is now deleted: `common ipv4_subnet`

```
{
    "$schema": "http://json-schema.org/draft-04/schema#",
    "type": "string",
    "pattern": "^((25[0-5]|2[0-4][0-9]|[01]?[0-9][0-9]?)\\.)
            {3}(25[0-5]|2[0-4][0-9]|[01]?[0-9]
                      [0-9]?)(\\/(3[0-2]|[0-2]?[0-9]))?$"
}
```

Three organization access APIs have been changed to substitute `common/ipv4_subnet.schema` with `common/ipv4_ipv6_subnet.schema`:

- **orgs_access_restrictions_post**
- **orgs_access_restrictions_put**

```
{
    "properties": {
        "ips": {
```

```
        "items": {
            "$ref": {
            "__old": "../common/ipv4_subnet.schema.json",
            "__new": "../common/ipv4_ipv6_subnet.schema.json"
            }
        }
         }
    }
}
```

settings_trusted_proxy_ips_put

```
{
    "properties": {
        "trusted_proxy_ips": {
        "items": {
            "properties": {
            "ip": {
            "$ref": {
            "__old": "../common/ipv4_subnet.schema.json",
            "__new": "../common/ipv4_ipv6_subnet.schema.json"
            }
        }
        }
    }
    }
```

Provisioning

Use the Public Stable Provisioning API to implement all current changes to your security policy, such as additions, changes, and deletions.

The Public Experimental Provisioning API supplies information about unprovisioned changes to security policy items.

Finally, the Policy Update Mode API controls when policy updates are applied to workloads.

Provisioning (public stable)

This Public Stable API provisions all current changes (additions, changes, and deletions) to your security policy.

This API can also return a collection of provisioning or individual provisioning versions.

To get information about unprovisioned changes to security policy items, find provisioning dependencies, delete unprovisioned security policy items, revert the last provisioned items, and check whether a security rule exists that allows communications between two workloads, see Provisioning - Public Experimental. [83]

Provisioning API Methods

Functionality	HTTP	URI
Provision the current set of modified security policy items.	`POST`	`[api_version][org_href]/sec_policy`
Get a list of all provisioned security policy versions.	`GET`	`[api_version][org_href]/sec_policy`
Get a specific version of a provisioned security policy.	`GET`	`[api_version][sec_policy_version_href]`

Provision All Items

Policy item additions, modifications, and deletions must be provisioned before they affect workloads.

URI to Provision All Items

```
POST api_version][org_href]/sec_policy
```

Provision All Items

This example passes a provisioning comment using the curl `-d` option (lowercase d) followed by the comment `'{"update_description":"make active"}'`. This operation provisions all draft policy items.

```
curl -i -X POST https://pce.my-company.com:8443/api/v2/orgs/2/
sec_policy -H "Content-Type: application/json" -u $KEY:$TOKEN -d
'{"update_description":"make active"}'
```

Response

After provisioning the draft security policy, the response provides information related to the operation, including the version HREF of the provisioning.

You can use a provision history HREF to get all modified items for a particular version.

The response also indicates how many workloads were affected, when the provisioning was done, which user did it, and any message that was provided.

```
{
      "href": "/orgs/2/sec_policy/80",
      "commit_message": null,    "version": 80,
      "workloads_affected": 3,
      "object_counts": 3,
      "created_at": "2020-26T21:48:46.446Z",
      "created_by": { "href": "/users/18" }
}
```

Provision Individual Items

Curl Example

The request body uses `update_description` instead of `commit_message`, and instead of `entities`, define an array of pending HREFs for each method as appropriate.

```
curl -i -X POST https://pce.my-company.com:8443/api/v2/orgs/2/
sec_policy -H "Content- Type:application/json" -u $KEY:$TOKEN
-d '{"change_subset":{"rule_sets":[{"href": "/orgs/2/sec_policy/draft/
rule_sets/843"}], "ip_lists": [{"href": "/orgs/2/sec_policy/draft/ip_lists/
151"}]}, "update_description":"Provisioning a ruleset and an ip list"}'
```

Request Body Prototype

The security policy POST request body has this format. Only define the methods used in the call, and don't include any unused methods in the request body.

```
{
    "update_description": "string",
    "change_subset": {
        "label_groups": [
        {
            "href": "string"
        }
    ],
    "services": [
        {
            "href": "string"
```

```
        }
    ],
    "rule_sets": [
        {
            "href": "string"
        }
    ],
    "ip_lists": [
        {
            "href": "string"
        }
    ],
    "virtual_services": [
        {
            "href": "string"
        }
    ],
    "firewall_settings": [
        {
            "href": "string"
        }
    ],
    "enforcement_boundaries": [
        {
            "href": "string"
        }
    ],
    "secure_connect_gateways": [
        {
            "href": "string"
        }
    ],
    "virtual_servers": [
        {
            "href": "string"
        }
    ]
```

Restore the Previous Security Policy

This API creates draft changes of the previous security policy's changes. When this API is called, there should not be any draft changes present in the PCE.

Curl Command to Restore the Security Policy

```
curl -i -X POSThttps://pce.my-company.com:8443/api/v2/orgs/1/sec_policy/127/
restore -H "Content-Type: application/json" -u $KEY:$TOKEN -d {}
```

Get All Provision Versions

This method gets the full history of all provisioned security policy versions.

URI to Get All Provisioned Versions

```
GET [api_version][org_href]/sec_policy
```

Get the Provision Versions

```
curl -i -X POST https://pce.my-company.com:8443/api/v2/orgs/1/
sec_policy/127/restore -H "Content-Type: application/json" -u $KEY:$TOKEN
-d {}
```

Response

Note that field `selective_enforcement_rules` was renamed to `enforcement_boundaries` in the `object_counts` property.

```
{
    "href": "string",
    "version": "string",
    "workloads_affected": 0,
    "commit_message": "string",
    "object_counts": {
        "rule_sets": 0,
        "ip_lists": 0,
        "services": 0,
        "virtual_services": 0,
        "label_groups": 0,
        "virtual_servers": 0,
        "firewall_settings": 0,
        "secure_connect_gateways": 0,
        "enforcement_boundaries": 0
    },
    "created_at": "string",
    "created_by": {
        "href": "string"
    }
}
```

Get an Individual Provision Version

This method gets a specific version of a provisioned policy.

Every time a security policy is provisioned, it gets a unique version ID, which is an HREF. This HREF can be obtained from a GET of all security policy provisioned versions and then used in this call.

URI to Get an Individual Version of a Provisioned Policy

```
GET  [api_version][sec_policy_version_href]
```

Curl Command to Get Version

```
curl -i -X GET https://pce.my-company.com:8443/api/v2/orgs/2/sec_policy/79
-H "Accept: application/json" -u $KEY:$TOKEN
```

Response

```
{
    "href": "string",
```

```
    "version": "string",
    "workloads_affected": 0,
    "commit_message": "string",
    "object_counts": {
        "rule_sets": 0,
        "ip_lists": 0,
        "services": 0,
        "virtual_services": 0,
        "label_groups": 0,
        "virtual_servers": 0,
        "firewall_settings": 0,
        "secure_connect_gateways": 0,
        "enforcement_boundaries": 0
    },
    "created_at": "string",
    "created_by": {
        "href": "string"
    }
}
```


Provisioning (Public Experimental)

This Public Experimental API gets information about unprovisioned changes to security policy items (rulesets, IP lists, security settings, labels and label groups, services, virtual services, and user groups). You can also find provisioning dependencies, delete unprovisioned security policy items, revert the last provisioned items, and check whether a security rule exists that allows communications between two workloads.

To provision security policy items and get information about one or more provisioned items, see Provisioning – Public Stable. [79]

Provisioning API Methods

Functionality	HTTP	URI
Get the collection of modified (`draft`) security policy items pending provisioning.	`GET`	`[api_version][org_href]/sec_policy/pending`
Check whether a rule exists between two workloads that allow communication.	`GET`	`[api_version][sec_policy_version_href]/allow`
Get the collection of all policy items that were modified in a specific version of a security policy.	`GET`	`[api_version][sec_policy_version_href]/modified_objects`
Delete all unprovisioned security policy item modifications (all unprovisioned `draft` changes) pending provisioning.	`DELETE`	`[api_version][org_href]/sec_policy/pending`
Revert a specified list of pending uncommitted security policy items. This method allows you to select specific items to revert.	`PUT`	`[api_version][org_href]/sec_policy/delete`
Determine if a specific set of objects can be provisioned, or if they are dependent on other objects that need to be provisioned as well.	`POST`	`[api_version]/sec_policy/draft/dependencies`
Used to see the policy impact before provisioning. This API is referencing `sec_policy_change_subset.schema.json`, which contains the property `change_subset`	`POST`	`[api_version]/sec_policy/impact`

Provisionable Policy Items

The following security policy items all require provisioning before they can take effect on managed workloads (workloads with a VEN installed on them). The total sum of these policy items constitutes the security policy.

- **IP Lists**: IP addresses, IP ranges, and CIDR blocks allowed to access managed workloads.
- **Label Groups**: Labels can be managed in label groups.
- **Rulesets**: Policy items that include labels and rules to define permitted communication between workloads and between groups.
- **Pairing Profiles**: A Pairing Profile applies certain properties to workloads as they pair with the PCE, such as labels and workload policy states.
- **Security Settings**: General network security settings, such as ICMP echo reply, allow or disable IPv6, and connectivity settings.
- **Services**: Definitions or discovery of existing services on your workloads.
- **Virtual Servers**: Allows rules that allow communication with workloads managed by a load balancer.
- **Virtual Services**: A virtual service is a single service (a port/protocol set) that can be used directly in a rule as a single entity. Labels that represent multiple virtual services can also be used to write rules.

- **Enforcement Boundaries:** Facilitate the implementation of allow-lists by narrowing the scope for segmentation so that users can reach a high level of system maintainability using a simple policy mode.

When the security policy is provisioned, the PCE recalculates any changes made to policy configurations and then transmits those changes to the VENs installed on the workloads.

Policy Provisioning States

This API operates on provisionable objects, which exist in either a `draft` (not provisioned) state or an `active` (provisioned) state.

Provisionable items include label groups, services, rulesets, IP lists, virtual services, firewall settings, enforcement boundaries, and virtual servers. For these objects, the URL of the API call must include the element called `:pversion`, which can be set to either `draft` or `active`.

Depending on the method, the API follows these rules:

- For GET operations — `:pversion` can be draft, active, or the ID of the security policy.
- For POST, PUT, DELETE — `:pversion` can be draft (you cannot operate on active items) or the ID if the security policy.

Get All Items Pending Provisioning

This method gets a list of all modified policy items pending provisioning.

URI to Get All Policy Items Pending Provisioning

This API allows the user to view a list of all policy objects pending provisioning bucketed by type. The UI uses this to generate the "draft changes" page.

```
GET [api_version][org_href]/sec_policy/pending
```

Get Items Pending Provisioning

```
curl -i -X GET https://pce.my-company.com:8443/api/v2/orgs/2/sec_policy/
pending -H "Accept:application/json" -u $KEY:$TOKEN
```

Response

```
---------
    ],
    "virtual_services": [
        {
            "name": "string",
            "href": "string",
            "updated_by": null,
            "updated_at": "2021-05-03T00:24:56Z",
            "update_type": "create",
            "caps": [
```

```
            "write"
            ]
        }
    ],
    "
            enforcement_boundaries
            ": [
        {
            "name": "string",
            "href": "string",
            "updated_by": null,
            "updated_at": "2021-05-03T00:24:56Z",
            "update_type": "create",
            "caps": [
            "write"
            ]
        }
    ]
}
```

The field `selective_enforcement_rules` was replaced with `enforcement_boundaries`.

Revert All Items Pending Provisioning

This method reverts (undoes) the current set of unprovisioned security policy modifications (all unprovisioned draft changes).

```
DELETE [api_version][org_href]/sec_policy/pending
```

Revert all items pending provisioning

```
curl -i -X DELETE https://pce.my-company.com:8443/api/v2/orgs/2/sec_policy/
pending -u $KEY:$TOKEN
```

Revert a List of Items Pending Provisioning

This API allows the user to revert a subset of policy objects via the change_subset field. via the `change_subset` field.

The field `selective_enforcement_rules` was replaced with `enforcement_boundaries`.

Revert a Specific List of Items Pending Provisioning

```
PUT [api_version][org_href]/sec_policy/delete
```

```
{
    "change_subset": {
    "label_groups": [
        {
            "href": "string"
        }
    ],
    "services": [
        {
```

```
            "href": "string"
        }
    ],
    "rule_sets": [
        {
            "href": "string"
        }
    ],
    "ip_lists": [
        {
            "href": "string"
        }
    ],
    "virtual_services": [
        {
            "href": "string"
        }
    ],
    "firewall_settings": [
        {
            "href": "string"
        }
    ],
    "secure_connect_gateways": [
        {
            "href": "string"
        }
    ],
    "virtual_servers": [
        {
            "href": "string"
        }
    ],
    "enforcement_boundaries": [
        {
            "href": "string"
        }
    ]
   }
}
```

If an empty request body is given,

```
{}
```

then all objects will be reverted.

Curl Command to Revert a Pending Rule

```
curl -i -X PUT https://pce.my-company.com:8443/api/v2/orgs/1/sec_policy/
delete -H "Accept: application/json" -H "Content-Type: application/json" -u
api_1fc24761346777702:'26c55be6892762b65f27aacc795076767f16ffcd7e9fde323a307
e5fd286eb8d' -d '{"change_subset":{"rule_sets":[{"href":"/orgs/1/sec_policy/
draft/rule_sets/3"}]}}'
```

Get Security Policy Dependencies

This public experimental API allows the user to determine the provisioning (or revert) dependencies for a particular policy object. The response JSON is also bucketed by object, and has the exact schema change.

URI to Get Specific Security Policy Dependencies

```
POST /sec_policy/draft/dependencies
```

Security Policy Properties

Parameter	Description
`change_subset`	Defines a hash of provisionable or revertible objects identified by their HREFs. Includes label groups, services, rulesets, IP lists, virtual services, and virtual servers. Each object of a specific type virtual services and virtual servers (for example, rule_sets) is represented in the request body as an array of HREFs for those object types. For `POST /api/v2/orgs/:xorg_id/sec_policy/impact`: • If provided, the impact will be calculated only on `change_subset`. • If missing, the impact will be calculated on all pending items.
`operation`	Determines if there are dependencies for *provisioning* or *reverting* the specified objects: • `commit`: Specify this value to check for dependencies before *provisioning* an object. • `revert`: Specify this value to check for dependencies before *reverting* an object that is in a `draft` state.
Sub properties of `change_subset` that represent provisionable objects	
`label_groups`	List of label groups in the draft state to check for provisioning dependencies identified by label group HREF.
`services`	List of services in the draft state to check for provisioning dependencies identified by service HREF.
`rule_sets`	List of rulesets in the draft state to check for provisioning dependencies identified by rule_set HREF.
`ip_lists`	List of IP lists in the draft state to check for provisioning dependencies, identified by IP list HREF.
`virtual_services`	List of virtual services in the draft state to check for provisioning dependencies identified by virtual service HREF. Reference to `common/href_object.schema.json`
`virtual_servers`	List of virtual servers in the draft state that you want to check for provisioning dependencies identified by virtual server HREF. Reference to `common/href_object.schema.json`
`firewall_settings`	Reference to `common/href_object.schema.json`
`enforcement_boundaries`	Reference to `common/href_object.schema.json`

Request Body

```
{
    "operation": "commit",
    "change_subset": {
        "enforcement_boundaries": [
        {
```

```
        "href": "/orgs/2/sec_policy/draft/enforcement_boundaries/51"
        }
        ]
    }
}
```

Check for Provisioning Dependencies

```
curl -i -X POST https://pce.my-company.com:8443/api/v2/orgs/7/sec_policy/
draft/dependencies -H "Content-Type: application/json" -u $KEY:$TOKEN
-d '{"operation":"commit", "change_subset": {"rule_sets":[{"href":"/
orgs/1/sec_policy/draft/rule_sets/9"}, {"href":"/orgs/1/sec_policy/draft/
rule_sets/3"}], "virtual_services": [{"href":"/orgs/1/sec_policy/draft/
virtual_services/xxxxxxxx-adeb-4895-8ff2-60c5b9833d9e"}, {"href":"/orgs/1/
sec_policy/draft/virtual_services/xxxxxxxx-12bc-4cfa-99ef-330c399bc78c"}]}'
```

Response

The response indicates that the field `selective_enforcement` was replaced with `enforcement_boudaries` following the change in the request.

```
    "$ref": "../common/href_object.schema.json"
    }
},
-        "selective_enforcement_rules": {
+        "enforcement_boundaries": {
        "type": "array",
        "items": {
        "$ref": "../common/href_object.schema.json"
```

If there are no dependencies for either commit or revert, the response returns an empty array.

```
[]
```

Get Modified Items in a Provisioned Version

This method gets a collection of all modified policy items in a specific version of the security policy.

Every time the security policy is provisioned, it gets a version that takes the form of an HREF. The HREF can be obtained when getting all provisioned versions of your security policy. You can use that provision version HREF when calling this method.

URI to Get All Modified Items in a Specific Provisioned Version

```
GET [api_version][sec_policy_version_href]/modified_objects
```

Curl Command Example

```
curl -X GET /orgs/{org_id}/sec_policy/{pversion}/modified_objects -u
$KEY:$TOKEN -H 'Accept: application/json'
```

Response (similar to the following)

```
{
    "update_type": null,
    "object_type": null,
    "href": null,
    "name": "string",
    "updated_at": "2021-05-03T00:24:56Z",
    "updated_by": null,
}
```

Required properties `updated_at` and `updated_by` have been added, and the properties `modified_by` and `modified_at` have been deleted.

Get Rules Allowing Communication

This method gets a list of all rules that allow communication between two workloads (and other entities) for a specific version of a provisioned security policy.

By default, the maximum number returned on a GET collection with this API is 500.

Check for Rules Between Workloads

```
GET /api/v2/orgs/{org_id}/sec_policy/{pversion}/allow
```

Query Parameters

Provide query parameters in the URI that specify the source workload IP address or HREF, the service HREF, and the destination workload HREF. You can obtain a workload HREF with a GET call on the Workloads API [263].

Parameter	Description	Type	Required
org_id	Organization	Integer	Yes
pversion	Security policy version	String	Yes
src_external_ip	The external IP of the source workload	String	No
OR	or		
src_workload	The URI of the source workload		
dst_external_ip	The external IP of the destination workload	String	No
OR	OR		
dst_workload	The URI of the destination workload		
service	The specific service to check	String	No
port	The specific port number to check	Integer	No
protocol	The specific protocol number to check	Integer	No

Curl Command to Get Rules Between Workloads

The workloads and the service are identified by their HREFs:

```
curl -X GET /orgs/{org_id}/sec_policy/{pversion}/allow -u $KEY:$TOKEN -H
'Accept: application/json'
```

Response

```
[
    {
    "href": "string",
    "enabled": true,
    "description": "string",
    "service": {
        "href": "string"
    },
    "ub_service": null,
    "sec_connect": true,
    "providers": [
    {
        "actors": "string",
        "label": {
        "href": "string"
        },
        "agent": {
            "href": "string"
        },
        "workload": {
            "href": "string"
```

```
        },
        "bound_service": {
            "href": "string"
        },
        "virtual_server": {
            "href": "string"
        },
        "ip_list": {
            "href": "string"
        }
    }
    ],
    "consumers": [
        {
        "actors": "string",
        "label": {
            "href": "string"
        },
        "agent": {
            "href": "string"
        },
        "workload": {
            "href": "string"
        },
        "bound_service": {
            "href": "string"
        },
        "ip_list": {
            "href": "string"
        }
    }
]
}
```

Example for POST /api/v2/orgs/1/sec_policy/impact

Each of the allowed properties, such as ip_lists, label_groups, and services, can be included in the request body of the POST call, and the response schema defines the format and values of this API request for the example in the request body.

`sec_policy_impact_post_response.schema.json`

```
{
    "$schema": "http://json-schema.org/draft-04/schema#",
    "type": "object",
    "required": ["num_sets", "num_managed_workloads",
"num_container_workloads",
                 "num_unmanaged_workloads"],
    "properties": {
        "num_sets": {
        "description": "number of affected sets",
        "type": "integer"
        },
        "num_virtual_servers": {
```

```
        "description": "number of affected virtual servers",
        "type": "integer"
        },
        "num_managed_workloads": {
        "description": "number of affected workloads of type Workload",
        "type": "integer"
        },
        "num_container_workloads": {
        "description": "number of affected workloads of type
ContainerWorkload",
        "type": "integer"
        },
        "num_unmanaged_workloads": {
        "description": "number of affected unmanaged workloads",
        "type": "integer"
       },
        "all_workloads_optimization": {
        "description": "flag to indicate if all-workloads-optimization has
been used",
        "type": "boolean"
        }
    }
}
```

Policy Update Mode

This Public Experimental API controls when policy updates are applied to workloads.

Overview of Policy Update Mode

The PCE has two policy update options:

- **Adaptive**: Apply policy changes as soon as you provision.
- **Static**: Apply policy changes at a later time, such as during a scheduled maintenance window.

By default, the PCE policy update mode is set to `Adaptive`, but you can configure `Static` policy update mode for certain sets of workloads identified by scopes. Workloads that share the same labels configured for static policy update scope *receive* policy changes from the PCE, but those changes *will not be applied* until a user or an orchestration system instructs the PCE to apply those changes.

Configuring static policy update mode requires defining a scope that contains one or more environment, application, or location labels and role labels. If a label type is not defined in the scope, that label type is interpreted as `All`. For example, if the policy update scope is

`Application = Checking, Location = China`,

the PCE interprets the scope as

`Application = Checking, Location = China, Environment = All`.

Methods

Functionality	HTTP	URI
Get the current policy update mode for your organization	`GET`	`[api_version][org_href]/sec_policy/draft/firewall_settings`
Change the policy update mode for your organization	`PUT`	`[api_version][org_href]/sec_policy/draft/firewall_settings`

Policy Update Parameters

Parameter	Description	Type	Required
`org_id`	Organization	Integer	Yes
`pversion`	Security Policy Version	String	Yes
`max_results`	Maximum number of policy objects to return (per type)	Integer	No

Policy Update Properties

The current `firewall_settings` resource specifies a combination of IPsec / IKE authentication method (PSK or certificate) for SecureConnect and Machine Authentication.

Parameter	Description	Type	Required
update_type	Type of update	String	Yes
static_policy_scopes	Scopes that have static policy application mode Reference to common/rule_set_scopes_get.schema.json		No
max_results	Maximum number of policy objects to return (per type)	Integer	No
ike_authentication_type	IKE authentication type to use for IPsec (SecureConnect and Machine Authentication)	String	No
allow_captive_portal_outbound	Defines whether or not to open the endpoint firewall to all outbound traffic when the VEN discovers a captive portal scenario	Boolean	No
containers_inherit_host_policy_scopes	Workloads that match the scope will apply the policy it receives to itself and the containers hosted by itl. Reference to common/rule_set_scopes_get.schema.json		
blocked_connection_reject_scopes	Scopes whose blocked connection action will be reject Reference to common/rule_set_scope_get.schema.json		
loopback_interfaces_in_policy_scopes	Workloads that match the scope will apply policy on loopback interfaces, and the loopback interface's IPs will be distributed to peers. Reference to common/rule_set_scope_get.schema.json		

Get Policy Update Mode

You can use this method to get the current policy update mode settings for your organization, which is part of your PCE security settings. This method contains a variable (:pversion) that can be used to return the security settings with `active` (currently provisioned) or `draft` state for your organization.

URI To Get Policy Update Mode

```
GET [api_version][org_href]/sec_policy/draft/firewall_settings
```

Draft or Active Policy Update Mode

Variable	Description
:pversion	Allows you to get: • `active`: The currently provisioned security settings, including policy update mode • `draft`: The draft state of any changed security settings that have not yet been provisioned, including policy update mode

Curl Command Get Active Policy Update Mode

This curl example gets the active (currently provisioned) security settings for your organization, which includes the policy update mode settings.

```
curl -i -X GET https://pce.my-company.com:8443/api/v2/orgs/7/sec_policy/
active/firewall_settings -H "Accept: application/json" -u $KEY:$TOKEN
```

Response Body

The `static_policy_scopes` property in the response (in blue) indicates that two static scopes have been configured for policy updates.

Each scope is defined as a JSON label array, including an Application, Environment, and Location label. The labels in the scope are identified by their HREFs.


```
{
    "href": "/orgs/7/sec_policy/active/firewall_settings",
    "created_at": "2015-10-23T22:01:01.151Z",
    "updated_at": "2017-09-02T19:08:55.623Z",
    "deleted_at": null,
    "created_by": { "href": "/users/0"  },
    "updated_by": { "href": "/users/14" },
    "deleted_by": null,
    "update_type": null,
    "allow_dhcp_client": true,
    "log_dropped_multicast": true,
    "log_dropped_broadcast": false,
    "allow_traceroute": true,
    "allow_ipv6": true,
    "allow_igmp": false,
    "track_flow": true,
    "system_rule_log_flow": false,
    "allow_path_mtu_discovery": true,
    "network_detection_mode": "single_private_brn",
    "static_policy_scopes": [
      [
        { "label": { "href": "/orgs/7/labels/83" } },
        { "label": { "href": "/orgs/7/labels/86" } },
        { "label": { "href": "/orgs/7/labels/94" } }
      ],
      [
        { "label": { "href": "/orgs/7/labels/82"  } },
        { "label": { "href": "/orgs/7/labels/100" } },
        { "label": { "href": "/orgs/7/labels/89"  } },
        { "label": { "href": "/orgs/7/labels/94"  } }
      ]
    ],
      "secure_connect_certs": {
      "default_issuer_name_match": "test",
      "scoped_certificates": []
    }
}
```

Change Policy Update Mode

The Change Policy Update Mode sets your organization's draft policy update mode, including adding or removing a policy scope.

The draft state of your policy update mode can be modified, but not the currently active (provisioned) version. First, change to the draft policy update mode, and then provision those changes.

URI To Change Policy Update Mode

```
PUT [api_version][org_href]/sec_policy/draft/firewall_settings
```

Request Properties

Property	Description	Type	Required
`static_policy_scopes`	A set of up to four labels, one or more of the type Application, Environment, Role, and Location. Each label in the policy scope is identified by its HREF, nested in a JSON array. Before updating the organization policy update mode, ensure you have the exact set of labels you want to use and their HREFs.	JSON array of strings	Yes

Request Body

This example shows the request body for two policy update scopes. The first has a single label scope, and the second scope has a set of three labels.

```
{
  "static_policy_scopes": [
    [
      { "label": { "href": "/orgs/1/labels/8" } }
    ],
    [
      { "label": { "href": "/orgs/1/labels/2"  } },
      { "label": { "href": "/orgs/1/labels/8"  } },
      { "label": { "href": "/orgs/1/labels/11" } }
    ]
  ]
}
```

Curl Command to Update Policy Update Mode

```
curl -i -X PUT https://pce.my-company.com:8443/api/v2/orgs/7/
firewall_settings -H "Content-Type: application/json" -u $KEY:$TOKEN -d
'{"static_policy_scopes":[[{"label":{"href":"/orgs/1/labels/8"}}],[{"label":
{"href":"/orgs/1/labels/2"}},{"label":{"href":"/orgs/1/labels/8"}},{"label":
{"href":"/orgs/1/labels/11"}}]]}'
```

Response

The response for a successful change to your policy update mode is an HTTP `204 No Content Operation`. No data is returned.

Remove all Static Policy Scopes

To remove all static policy scopes, pass an empty JSON array:

```
PUT [api_version][org_href]/sec_policy/draft/firewall_settings
{ "static_policy_scopes": [] }
```

NOTE

The policy update mode is set to Adaptive when all static policy scopes are removed.

Curl Command to Remove Static Policy Scopes

```
curl -i -X PUT https://pce.my-company.com:8443/api/v2/orgs/7/
firewall_settings -H "Content-Type: application/json" -u $KEY:$TOKEN -d
'{"static_policy_scopes":[]}'
```

Virtual Server Filtering

Filtering the discovered virtual servers and drafting virtual server endpoints makes it easier to manage large numbers of virtual servers.

The existing Public Experimental API endpoints for virtual servers have been changed to support the required filters and associated UI operations. You can now filter a discovered virtual server collection by:

- name
- SLB (API uses href as per conventions)
- VIP: IP, proto, port (any or all)
- virtual server href

Virtual Server Endpoints

New filters have been added for the following existing endpoints:

- `GET /orgs/:xorg_id/discovered_virtual_servers`
- `GET /orgs/:xorg_id/sec_policy/:pversion/virtual_servers`

NOTE

These Interface endpoints are available only for API version V2.

New Filters for Virtual Servers

Discovered Virtual Servers

Filter	URI Example	Notes
`name`	`/discovered_virtual_servers?name=myvip`	Supports partial and incomplete matches
`slb`	`/discovered_virtual_servers?slb=/orgs/1/slbs/<uuid>`	
`vip`	`/discovered_virtual_servers?vip=10.1`	Supports suffix matches, e.g. 10.1 matches any IP address that starts with "10.1", "10.100", ... but not "110.x"
`vip-proto`	`/discovered_virtual_servers?vip_proto=6`	
`vip_port`	`/discovered_virtual_servers?vip_port=80`	
`has_virtual_server`	`/discovered_virtual_servers?has_virtual_server=true`	The `virtual_server_mode` and `virtual_server_labels` MUST be used with `has_virtual_server=true`, otherwise an error will be raised.
`virtual_server_mode`	`/discovered_virtual_servers?virtual_server_mode=enforced`	Options for this filter are "unmanaged" or "enforced"
`virtual_server_labels`	`/discovered_virtual_servers?virtual_server_labels=[[/orgs/1/labels/2, /orgs/1/labels/3], [/orgs/1/labels/4]]` (JSON encoded array of arrays)	
`virtual_server`	`/discovered_virtual_servers?virtual_server=/orgs/1/sec_policy/draft/virtual_servers/<uuid>`	

Virtual Servers

Filter	URI Example	Notes
name	/virtual_servers?name=myvip	Supports partial and incomplete matches
slb	/virtual_servers?slb=/orgs/1/slbs/<uuid>	
vip	/virtual_servers?vip=10.1	Supports suffix matches, e.g. 10.1 matches any IP address that starts with "10.1", "10.100", ... but not "110.x"
vip-proto	/virtual_servers?vip_proto=6	
vip_port	/virtual_servers?vip_port=80	
mode	/virtual_servers?mode=enforced	Options for this filter are "unmanaged" or "enforced"
labels	/virtual_servers?[[/orgs/1/labels/2, /orgs/1/labels/3], [/orgs/1/labels/4]] (JSON encoded array of arrays)	
discovered_virtual_server	/virtual_servers?discovered_virtual_server=/orgs/1/discovered_virtual_servers/<uuid>	

Schema Changes

discovered_virtual_servers

The following object has been added to the schema:

```
{
[... existing fields ...]
"virtual_server" : {
      "href": "/orgs/1/sec_policy/draft/virtual_servers/fbae7cd2-04c3-4d7b-
a628-2d69a9d64a71" ,
      "update_type" : "create", # or "update", "delete", null
      "mode": "enforced", # or "unmanaged"
      "labels" [
           { "href": "/orgs/1/labels/2", "key": "role", "value":
"database"},
           { "href": "/orgs/1/label/12", "key": "env", "value":
"production"}
      ]
    }
}
```

virtual_servers

The "mode" and "vip_port" fields have been added to the "discovered_virtual_server sub-object" to reflect the result of filtering.

```
{
    [... existing fields ...]
```

```
    "discovered_virtual_server" : {
        "dvs_identifier" :  "5111ecf75c61544720d800cce97a624d" ,
        "href" :  "/orgs/1/discovered_virtual_servers/c1cd1f00-7b48-4c43-
a099-f758ac1a9b40" ,
        "mode" :  "snat" ,
        "name" :  "Common/vip1" ,
        "vip_port" : {
            "port" :  "80" ,
            "protocol" :  6 ,
            "vip" :  "10.0.0.109"
        }
    }
}
```

slb_config

This schema has been deprecated. It was used for `nfc` (Network Function Controller), which is now deprecated.

Request and Response Examples

Discovered Virtual Servers

Curl Command for Discovered Virtual Servers

```
curl -i -u
api_1bbac8b7295e9b512:343461267jks009651245343461267jks00965124b27074fa181f1
edb3bb4a3 https://2x2testvc27.ilabs.io:8443/api/v2/orgs/1/
discovered_virtual_servers
```

Response Body

```
[{
    "href": "/orgs/1/discovered_virtual_servers/52044aea-14db-4510-
a1c6-00231230034",
    "dvs_identifier": "96803bd07185cd093dd800231230034",
    "name": "Common/QL_VIP_1",
    "nfc": {
        "href": "/orgs/1/nfcs/0bcf6c3d-f588-44c7-a269-00231230034"
        },
    "slb": {
        "href": "/orgs/1/slbs/84a1cd93-142f-480d-b9f8-00231230034"
        },
    "vip_port": {
        "vip": "172.16.27.88",
        "protocol": 6,
        "port": "8080"
        },
    "local_ips": ["172.16.26.18", "172.16.27.18"],
    "mode": "snat",
    "snat_type": "snat_pool",
    "snat_pool_ips": ["172.16.26.27", "172.16.26.18", "172.16.27.18"],
    "service_checks": [{
        "protocol": 1
        }],
    "created_at": "2021-02-26T08:32:02.131Z",
```

```
    "updated_at": "2021-02-26T08:32:02.131Z",
    "created_by": {
        "href": "/orgs/1/nfcs/0bcf6c3d-f588-44c7-a269-00231230034"
        },
    "updated_by": {
        "href": "/orgs/1/nfcs/0bcf6c3d-f588-44c7-a269-00231230034"
        }
        }, {
    "href": "/orgs/1/discovered_virtual_servers/073c40ec-7357-44f4-
a66d-002312300349",
    "dvs_identifier": "b679034796cdde929a000231230034",
    "name": "Common/QL_VIP_2",
    "nfc": {
        "href": "/orgs/1/nfcs/0bcf6c3d-f588-44c7-a269-00231230034"
        },
    "slb": {
        "href": "/orgs/1/slbs/84a1cd93-142f-480d-b9f8-00231230034"
        },
    "vip_port": {
        "vip": "172.16.27.71",
        "protocol": 6,
        "port": "8080"
        },
    "local_ips": ["172.16.26.18", "172.16.27.18"],
    "mode": "snat",
    "snat_type": "snat_pool",
    "snat_pool_ips": ["172.16.26.28", "172.16.26.18", "172.16.27.18"],
    "service_checks": [{
        "protocol": 1
        }],
    "created_at": "2021-02-26T08:32:02.177Z",
    "updated_at": "2021-02-26T08:32:02.177Z",
    "created_by": {
        "href": "/orgs/1/nfcs/0bcf6c3d-f588-44c7-a269-00231230034"
                },
    "updated_by": {
        "href": "/orgs/1/nfcs/0bcf6c3d-f588-44c7-a269-00231230034"
        }
    }
]
```


Response Body, another example


```
[
   {
    "href": "/orgs/1/discovered_virtual_servers/5db1ce10-263a-44fb-8c0c-
a2312dfb2e6a",
    "dvs_identifier": "the_test_dvs-1",
    "name": "Test DVS No. 1",
    "vip_port": {
        "vip": "30.55.148.143",
        "protocol": 6,
        "port": "8001"
    },
    "local_ips": [
```

```
        "10.0.0.1"
    ],
    "mode": "snat",
    "slb": {
        "href": "/orgs/1/slbs/8798cea8-1fd4-40e3-a2f1-adae6f094766"
    },
    "nfc": {
        "href": "/orgs/1/nfcs/7c6ae23f-5532-41b0-9b1e-cf9c689de0ae"
    },
    "network_enforcement_node": {
        "href": "/orgs/1/network_enforcement_nodes/7c6ae23f-5532-41b0-9b1e-
cf9c689de0ae"
    },
    "snat_type": "snat_local_ips",
    "service_checks": [],
    "created_at": "2022-09-09T22:19:49.915Z",
    "updated_at": "2022-09-09T22:19:49.915Z",
    "created_by": {
        "href": "/users/0"
    },
    "updated_by": {
        "href": "/users/0"
    },
    "virtual_server": {
        "href": "/orgs/1/sec_policy/draft/virtual_servers/
ba700305-29b9-4d6a-8bed-c8476753c327",
        "update_type": null,
        "mode": "enforced",
        "labels": [
        {
           "href": "/orgs/1/labels/14",
           "key": "role",
           "value": "LBL-ROLE-1"
        },
        {
           "href": "/orgs/1/labels/15",
           "key": "loc",
           "value": "LBL-LOC-1"
        }
    ]
}
{
    "href": "/orgs/1/discovered_virtual_servers/de5f454e-e95b-40c8-a128-
fc27a1bed840",
    "dvs_identifier": "the_test_dvs-2",
    "name": "Test DVS No. 2",
    "vip_port": {
        "vip": "34.92.48.237",
        "protocol": 6,
        "port": "8002"
        },
    "local_ips": [
        "10.0.0.2"
    ],
    "mode": "snat",
```

```
    "slb": {
        "href": "/orgs/1/slbs/8798cea8-1fd4-40e3-a2f1-adae6f094766"
    },
    "nfc": {
        href": "/orgs/1/nfcs/7c6ae23f-5532-41b0-9b1e-cf9c689de0ae"
    },
    "network_enforcement_node": {
        "href": "/orgs/1/network_enforcement_nodes/7c6ae23f-5532-41b0-9b1e-
cf9c689de0ae"
    },
    "snat_type": "snat_local_ips",
    "service_checks": [],
    "created_at": "2022-09-09T22:19:49.919Z",
    "updated_at": "2022-09-09T22:19:49.919Z",
    "created_by": {
        "href": "/users/0"
    },
    "updated_by": {
        "href": "/users/0"
    },
    "virtual_server": {
        "href": "/orgs/1/sec_policy/draft/virtual_servers/
e1502bf3-0992-4167-b84f-eaebd73cc2d7",
        "update_type": null,
        "mode": "enforced",
        "labels": [
        {
            "href": "/orgs/1/labels/28",
            "key": "role",
            "value": "LBL-ROLE-2"
            },
            {
            "href": "/orgs/1/labels/29",
            "key": "loc",
            "value": "LBL-LOC-2"
        }
         ]
       }
 }
```


Curl Command for Virtual Servers

```
curl -i -u
api_1bcab8b7295e9b512:343461267jks00965124500jkjdmnwe00231230034dfd256124fa1
81f1edb3bb4a3 https://2x2testvc27.ilabs.io:8443/api/v2/orgs/1/sec_policy/
draft/virtual_servers
```

Response Body


```
[{
    "href": "/orgs/1/sec_policy/draft/virtual_servers/
5c7aeb96-56e2-4af8-8b4e-00231230034",
    "created_at": "2021-02-26T08:38:15.298Z",
    "updated_at": "2021-02-26T08:39:21.676Z",
    "deleted_at": null,
```

```
    "created_by": {
        "href": "/users/1"
        },
    "updated_by": {
        "href": "/users/1"
        },
    "deleted_by": null,
    "update_type": null,
    "name": "Common/QL_VIP_1",
    "description": "",
    "discovered_virtual_server": {
            "href": "/orgs/1/discovered_virtual_servers/52044aea-14db-4510-
a1c6-00231230034"
            },
    "dvs_name": "Common/QL_VIP_1",
    "dvs_identifier": "96803bd07185cd093dd800231230034",
    "labels": [{
        "href": "/orgs/1/labels/1185",
        "key": "role",
        "value": "Database_VIP_1"
    }, {
        "href": "/orgs/1/labels/1178",
        "key": "app",
        "value": "Application_1"
    }, {
        "href": "/orgs/1/labels/1176",
        "key": "loc",
        "value": "test_place_1"
    }, {
        "href": "/orgs/1/labels/1174",
        "key": "env",
        "value": "Production"
    }],
    "service": {
        "href": "/orgs/1/sec_policy/draft/services/1"
        },
    "providers": [{
        "label": {
            "href": "/orgs/1/labels/1183",
            "key": "role",
            "value": "Web"
        }
    }, {
        "label": {
            "href": "/orgs/1/labels/1178",
            "key": "app",
            "value": "Application_1"
        }
    }, {
        "label": {
            "href": "/orgs/1/labels/1176",
            "key": "loc",
            "value": "test_place_1"
        }
    }, {
```

```
        "label": {
            "href": "/orgs/1/labels/1174",
            "key": "env",
            "value": "Production"
        }
    }],
    "mode": "unmanaged"
}]
```

Virtual Server Discoveries

Virtual server discovery happens passively once the Server Load Balancer (SLB) is configured and the Network Enforcement Node (NEN) receives the SLB configuration changes. However, users might want to be able to run virtual server discovery on demand.

The new schema `network_enforcement_nodes_virtual_server_discovery_jobs_put.schema.json` is used to create a virtual server discovery job request that contains the slb_name and virtual server ip_address, and port. NEN picks up the request, launches the discovery of the virtual server information, and posts the results back.

Discovery Job On-demand

Use the following API:

```
POST /api/v2/orgs/1/network_enforcement_nodes/virtual_server_discovery_jobs
```

where the required properties are:

`slb_name`

- Description: Name of the SLB to interrogate.
- Format: String

`virtual_server_infos`

- Description: An array of virtual_server_info objects consisting of virtual_server port and IP address
- Format: Array of Objects

Sample for Request:

```
{
    "$schema": "http://json-schema.org/draft-04/schema#",
    "description": "Details of Virtual Servers to discover",
    "type": "object",
    "additionalProperties": false,
    "required": ["slb_name", "virtual_server_infos"],
    "properties": {
    "slb_name": {
    "description": "Name of SLB to interrogate"
```

```
    "type": "string"
},
    "virtual_server_infos": {
    "description": "IP address and port info of Virtual Servers to
discover",
    "type": "array",
    "additonalProperties": false,
    "minItems": 1,
    "items": {
    "type": "object",
    "required": ["ip_address", "port"],
    "properties": {
        "ip_address": {
        "description": "Virtual Server IP address",
        "type": "string"
    },
    "port": {
        "description": "Virtual Server port",
        "type": "integer"
        }
    }
}
```

Sample Response

```
{
"$schema": "http://json-schema.org/draft-04/schema#",
"description": "Details of Virtual Servers discovery job",
"type": "object",
"additionalProperties": false,
"properties": {
    "href": {
    "description": "URI of Virtual Servers discovery job",
    "type": "string"
    }
}
```

Check the Status of Discovery Job

To find out the results of the discovery request, use the following command:

```
GET /api/v2/orgs/1/network_enforcement_nodes/
virtual_server_discovery_jobs/:job_uuid
```

```
{
    "$schema": "http://json-schema.org/draft-04/schema#",
    "description": "Details of Virtual Servers discovery job",
    "type": "object",
    "additionalProperties": false,
    "required": ["status", "created_at", "created_by"],
    "properties": {
            "href": {
            "description": "URI of the requested discovery job",
            "type": "string"
            }
            "status": {
```

```
            "description": "The current state of the request",
            "type": "string",
            "enum": ["pending", "running", "done"]
            },
            "created_at": {
            "description": "The time (rfc3339 timestamp) at which this job
was created",
            "type": "string",
            "format": "date-time"
            },
            "completed_at": {
            "description": "The time (rfc3339 timestamp) at which this job
was completed",
            "type": "string",
            "format": "date-time"
            },
            "created_by": {
            type": "object",
        "required": ["href"],
        "properties": {
        "href": {
        "description": "User who originally created this Virtual Server
discovery job",
        "type": "string"
        }
          }
      },
     "connection_state": {
        "description": "Status of most recent connection to the SLB device",
        "type": "string",
        "enum": ["pending", "successful", "cannot_resolve",
"cannot_connect", "bad_credentials", "bad_certificate", "bad_request",
"dup_device"]
    },
    "virtual_server_infos": {
        "description": "Information of individual virtual server
discovered",
        "type": "array",
        "minItems": 1,
        "items": {
        "type": "object",
        "additionalProperties": false,
        "properties": {
        "ip_address": {
        "description": "Virtual server IP address",
        "type": "string"
    },
    "port": {
        "description": "Virtual server port",
        "type": "integer"
        },
        "discovered_virtual_server": {
        "description": "Discovered Virtual Server. Null indicates not
found",
        "type": "object",
```

```
        "required": ["href"],
        "properties": {
        "href": {
        "description": "URI of Discovered Virtual Server",
        "type": "string"
        }
      }
}
```

If a virtual server is discovered, the response might look as follows:

```
{
    "status" : "done",
    "created_at" : "2021-7-19T07:20:50.52Z",
    "created_by" : {
        "href" : "api/v2/orgs/1/users/1"
    },
    "connection_state" : "successful",
    "completed_at : "2021-7-19T07:20:54.97Z",
    "virtual_server_infos" : [
        { "ip_address" : "10.2.4.54",
        "port" : 443,
        "discovered_virtual_server" : {
        "href" : "api/v2/orgs/1/discovered_virtual_servers/
7a597ef0-6609-4927-9eee-ce403517d850"
        { "ip_address" : "10.23.23.2",
        "port" : 8443,
        discovered_virtual_server" : {
        "href" : "api/v2/orgs/1/discovered_virtual_servers/
6a597ef0-6609-4927-9eee-ce403517d850"
        }
      ]
}
```

If the connection was not established, the response might look as follows:

```
{
    "status" : "done",
    "connection_state" : "cannot_connect",
    "created_at" : "2021-7-19T07:20:50.52Z",
    "completed_at : "2021-7-19T07:20:54.97Z",
    "created_by" : {
        "href" : "api/v2/orgs/1/users/1"
    }
}
```

Rulesets and Rules

Illumio's security policy includes three rule types: intra-scope rules, extra-scope rules, and custom iptables rules. The scope of a ruleset determines which workloads receive the rule-set's rules:

- Intra-scope rules allow communication between providers and consumers within a specific scope.
- Extra-scope rules permit communication between applications. You can write rules so that consumers within or outside a specified scope can access the providers within a scope. For extra-scope rules, the labels used in the scope must match the labels used by the provider.
- Custom iptables rules are needed for your applications as part of the rules managed by the PCE. These rules help preserve configured iptables from native Linux host configurations by allowing you to include them with the rules for your policy.

You can combine multiple types of rules in a single ruleset.

Rulesets

This Public Stable API gets, creates, updates, and deletes rulesets. Rulesets contain rules and scopes, which define where the rules apply.

Ruleset API Methods

Functionality	HTTP	URI
Get a collection of rulesets.	`GET`	`[api_version][org_href]/sec_policy/rule_sets`
Get a specified ruleset.	`GET`	`[api_version[org_href]/sec_policy/rule_sets/rule_set_id]`
Create a ruleset.	`POST`	`[api_version][org_href]/sec_policy/rule_sets`
Update a specified ruleset.	`PUT`	`[api_version][org_href]/sec_policy/rule_sets/rule_set_id]`
Delete a specified ruleset.	`DELETE`	`[api_version][org_href]/sec_policy/rule_sets/rule_set_id]`

Active vs. Draft

This API operates on provisionable objects, which exist in either a `draft` (not provisioned) state or an `active` (provisioned) state.

Provisionable items include label groups, services, rulesets, IP lists, virtual services, firewall settings, enforcement boundaries, and virtual servers. For these objects, the URL of the API call must include the element called `:pversion`, which can be set to either `draft` or `active`.

Depending on the method, the API follows these rules:

- For GET operations — `:pversion` can be draft, active, or the ID of the security policy.
- For POST, PUT, DELETE — `:pversion` can be draft (you cannot operate on active items) or the ID if the security policy.

Ruleset Components

Rulesets are the core of the Illumio Core policy model, and consist of the following elements:

- **Scopes**: Sets of labels (application, environment, and location) that define the boundaries of the rules in a ruleset. If the workloads specified in the rules share the same labels in a ruleset scope, then those workloads and their communications are governed by the rules of the ruleset.

  A scope can contain zero or more application, environment, and location labels. A scope can also contain one or more label groups.

  If the scope is an empty array (`[]`), then the scope includes all applications, environments, and locations.

  If one of the label types is not specified, then all instances of that type are permitted. For example, if application labels are omitted but environment and location labels are present, then all applications are within the scope.

  A label type cannot be used in a rule unless the scope for the label type is "All." For example, to use a location label, the scope would have to be an empty array (`[]`), or if there is an application label and an environment label in the scope, the location label cannot be defined in the scope.

  A ruleset is not limited to a single scope. A rule can contain multiple scopes depending on the needs of the security policy.

  IMPORTANT

  Role labels are not used in scopes, but can be used in rules. Never use a role label in a scope.

- **Rules**: A security rule consisting one or more providers (provides a service over a port and protocol), one or more consumers (consumes the service offered by the provider), and one or more services. A provider or consumer can be an individual workload, a role label that represents multiple workloads, IP lists, and so on.

Example Ruleset Scope

Each label in a scope is identified by its HREF. For example, this is the JSON representation of a single ruleset scope with three labels.

Each label must have a different key (role, app, loc, or env). Duplicate label keys are allowed in a scope only if they are in a label group.

```
{
  "scopes": [
    [
      {"label": {"href": "/orgs/7/labels/105"}},
      {"label": {"href": "/orgs/7/labels/88"}},
      {"label": {"href": "/orgs/7/labels/98"}}
    ]
  ]
}
```

Ruleset Rules

NOTE

The common schema `consuming_security_principals` has been replaced by two other APIs: `consuming_security_principals_get` and `consuming_security_principals_put`

Ruleset rules define the allowed communication between workloads, or between workloads and IP lists.

For information, see Rules [122].

Get Rulesets

This method gets all of the rulesets in your organization. This method gets those rulesets that are in the "draft" policy state, which means the current state of rulesets that have not been provisioned.

By default, the maximum number returned on a GET collection of rulesets is 500.

NOTE

To return more than 500 rulesets, use an Asynchronous GET Collection.

URI to Get a Collection of Rulesets

`pversion`: Contains provisionable objects, which exist in either a `draft` (not provisioned) or `active` (provisioned) state. .

```
GET [api_version][org_href]/sec_policy/:pversion/rule_sets
```

URI to Get an Individual Ruleset

```
[api_version[org_href]/sec_policy/rule_sets/rule_set_id]
```

Query Parameters

You can use the following query parameters to restrict the results of the query to get a collection of rulesets.

Parameter	Description	Type	Required
`org_id`	Organization	Integer	Yes
`pversion`	Security Policy Version	String	Yes
`rule_set_id`		Integer	Yes
`name`	Name of the rulesets to filter, which must be unique. This parameter supports partial matches.	String	No
`description`	Description of Rule Set(s) to return. Supports partial matches	String	No
`external_data_set`	The data source from which the resource originates. For example, if ruleset information is stored in an external database.	String, Null	No
`external_data_reference`	A unique identifier within the external data source. For example, if ruleset information is stored in an external database.	String, Null	No
`enabled`	Enabled flag	Boolean	No
`update_type`	Type of update	String	No
`scopes`	Rule set scopes	Array	No
	• `label`: label URI • `label_group`: label group URI	String	
`rules`	Array of rules in this rule set	Object	No

	Required properties:
	`enabled`: Enabled flag
	`description`
	`external_data_set`
	`external_data_reference`
	`ingress_service`		

Properties

Property	Description	Type	Required
enabled	Enabled flag	Boolean	Yes
name	Name of the rulesets to filter. This parameter supports partial matches.	String	Yes
scopes	Reference to common/rule_set_scopes_get.schema.json		Yes
rules	Array of rules in this rule set Reference to sec_policy_rule_sets_sec_rules_get.schema.json		Yes
created_at	Timestamp when this rule set was first created	String	Yes
updated_at	Timestamp when this rule set was last updated	String	Yes
deleted_at	Timestamp when this rule set was deleted	String, Null	Yes
created_by	User who originally created this rule set	Object	No
updated_by	User who last updated this rule set	Object	No
deleted_by	User who deleted this rule set	Object, Null	No
update_type	Type of update Reference to common/sec_policy_update_type.schema.json		No
external_data_set	The data source from which the resource originates. For example, if ruleset information is stored in an external database.	String	No
external_data_reference	A unique identifier within the external data source. For example, if ruleset information is stored in an external database.	String	No
ip_tables_rules	Array of iptables rules in this rule set. Reference to common/ip_tables_rules_get.schema.json		No

Create a Ruleset

This method creates an individual ruleset. The PCE web console supports up to 500 rules per ruleset.

NOTE

To write more than 500 rules for a particular ruleset, create additional rulesets, or use the Illumio Core REST API (rulesets with more than 500 rules are not fully displayed in the PCE web console).

URI to Create a Ruleset

`POST [api_version][ruleset_href]`

Properties for POST

Property	Description	Type	Required
`name`	Name of the new ruleset, which must be unique.	String	Yes
`scopes`	Reference to `common/rule_set_scopes_put.schema.json`		Yes
`rules`	Reference to `sec_policy_rule_sets_sec_rules_post.schema.json`		No
`ip_tables_rules`	Array of custom iptables rules in this rule set. Reference to `common/ip_tables_rules_post.schema.json`		No
`external_data_set`	External data set identifier	String, Null	No
`external_data_reference`	External data reference identifier.	String, Null	No
`enabled`	Enabled flag	Boolean	Yes
`scopes`	Reference to `common/rule_set_scopes_put.schema.json`		Yes
`rules`	Array of rules in this rule set Reference to `sec_policy_rule_sets_sec_rules_post.schema.json`		Yes

Update a Ruleset

To update an individual ruleset, you need the HREF of the ruleset you want to update, which can be obtained when you get a collection or an individual ruleset.

If you want to add a single rule to an existing ruleset, use

`PUT /api/v2/orgs/1/sec_policy/draft/rule_sets/123/sec_rules`.

Properties for PUT

Property	Description	Type	Required
`name`	Name of the ruleset to update, must be unique	String	No
`external_data_set`	External data set identifier	String, Null	No
`external_data_reference`	External data reference identifier.	String, Null	No
`enabled`	Enabled flag	Boolean	Yes
`update_type`	Type of update		No
	Reference to `common/sec_policy_update_type.schema.json`		
`scopes`	Reference to `common/rule_set_scopes_put.schema.json`		No
`rules`	Array of rules in this rule set	Object	No
	Required properties:		
	"href"		
	"enabled",		
	"providers",		
	"consumers",		
	"ingress_services",		
	"resolve_labels_as"		
`consumers`	Reference to `sec_policy_rule_sets_sec_rules_consumers_put.schema.json`		
`consuming_security_principals`	Reference to `common/ consuming_security_principals_put.schema.json`		
`network_type`	Reference to `common/ rule_network_type.schema.json`		
`use_workload_subnets`	Reference to `sec_ rule_use_workload_subnets.schema.json`		

Delete a Ruleset

To delete an individual ruleset, you need the HREF of the ruleset you want to delete, which can be obtained when you get a collection of rulesets.

URI to Delete an Individual Ruleset

```
DELETE [api_version][ruleset_href]
```

Examples

Get a Ruleset

```
$curl -X GET https://pce.my-company.com:8443/api/v2/orgs/1/sec_policy/draft/
rule_sets -H "Accept: application/json" -u
api_1c2618a67847c94b8:98c76f7a4563f29cd78b3392684cd5ec09534bafe5197fe8e901d9
5561bdd8f5| jq
```

Response


```
[
    {
        "href": "/orgs/1/sec_policy/draft/rule_sets/1",
        "created_at": "2023-04-05T23:08:32.578Z",
        "updated_at": "2023-04-05T23:08:32.632Z",
        "deleted_at": null,
        "created_by": {
            "href": "/users/0"
        },
        "updated_by": {
            "href": "/users/0"
        },
        "deleted_by": null,
        "update_type": null,
        "name": "Default",
        "description": null,
        "enabled": true,
        "scopes": [
        []
        ],
        "rules": [
        {
            "href": "/orgs/1/sec_policy/draft/rule_sets/1/sec_rules/1",
            "created_at": "2023-04-05T23:08:32.599Z",
            "updated_at": "2023-04-05T23:08:32.632Z",
            "deleted_at": null,
            "created_by": {
                "href": "/users/0"
            },
            "updated_by": {
                "href": "/users/0"
            },
            "deleted_by": null,
            "update_type": null,
            "description": "Allow outbound connections",
            "enabled": true,
            "providers": [
                {
                "ip_list": {
                "href": "/orgs/1/sec_policy/draft/ip_lists/1"
                }
                }
            ],
            "consumers": [
```

```
            {
            "actors": "ams"
            }
            ],
        "consuming_security_principals": [],
            "sec_connect": false,
            "stateless": false,
            "machine_auth": false,
            "unscoped_consumers": false,
            "network_type": "brn",
            "use_workload_subnets": [],
            "ingress_services": [
            {
                "href": "/orgs/1/sec_policy/draft/services/1"
            }
            ],
            "egress_services": [],
            "resolve_labels_as": {
            "providers": [
            "workloads"
            ],
            "consumers": [
            "workloads"
            ]
            }
            }
            ],
        "ip_tables_rules": [],
            "caps": [
            "write",
            "provision"
            ]
            },
        {
            "href": "/orgs/1/sec_policy/draft/rule_sets/3",
            "created_at": "2023-04-05T23:50:05.591Z",
            "updated_at": "2023-04-06T19:03:49.947Z",
            "deleted_at": null,
            "created_by": {
                "href": "/users/1"
            },
            "updated_by": {
                "href": "/users/1"
            },
            "deleted_by": null,
            "update_type": null,
            "name": "ruleset1"
"        "description": "",
        "enabled": true,
        "scopes": [
        []
        ],
    "rules": [
        {
        "href": "/orgs/1/sec_policy/draft/rule_sets/3/sec_rules/9",
```

```
        "created_at": "2023-04-06T00:58:55.061Z",
        "updated_at": "2023-04-06T00:58:55.088Z",
        "deleted_at": null,
        "created_by": {
            "href": "/users/1"
        },
        "updated_by": {
            "href": "/users/1"
        },
        "deleted_by": null,
        "update_type": null,
        "description": "",
        "enabled": true,
        "providers": [
        {
        "label": {
            "href": "/orgs/1/labels/14"
        },
        "exclusion": false
        }
        ],
        "consumers": [
        {
        "label": {
            "href": "/orgs/1/labels/15"
        },
        "exclusion": false
        }
        ],
    "consuming_security_principals": [],
        "sec_connect": true,
        "stateless": false,
        "machine_auth": false,
        "unscoped_consumers": false,
        "network_type": "brn",
        "use_workload_subnets": [],
        "ingress_services": [
            {
            "href": "/orgs/1/sec_policy/draft/services/9"
        },
        {
        "port": 23000,
        "proto": 6
        }
        ],
        "egress_services": [],
        "resolve_labels_as": {
        "providers": [
        "workloads"
        ],
        "consumers": [

"workloads"

        ]
```

```
        }
    }
        ],
        "ip_tables_rules": [],
        "caps": [
        "write",
        "provision"
        ]
    }
]
```

Create a Ruleset

```
$curl -u
api_1c2618a67847c94b8:98c76f7a4563f29cd78b3392684cd5ec09534bafe5197fe8e901d9
5561bdd8f5-X POST -H 'Content-Type: application/json' -d
' {"name":"ruleset3","description":"","scopes":[[{"exclusion":false,"label":
{"href":"/orgs/1/labels/14"}}]]}'https://2x2testvc168.ilabs.io:8443/api/v2/
orgs/1/sec_policy/draft/rule_sets | jq
```

Response

```
{
    "href": "/orgs/1/sec_policy/draft/rule_sets/16",
    "created_at": "2023-04-06T18:46:34.718Z",
    "updated_at": "2023-04-06T18:46:34.727Z",
    "deleted_at": null, "created_by": {
        "href": "/users/1"
        },
    "updated_by": {
        "href": "/users/1"
        },
    "deleted_by": null,
    "update_type": "create",
    "name": "ruleset3",
    "description": "",
    "enabled": true, "scopes": [
        [
        {
        "label": {
            "href": "/orgs/1/labels/14"
        },
        "exclusion": false
        }
        ]
    ],
    "rules": [],
        "ip_tables_rules": [], "caps": [
        "write",
        "provision"
    ]
}
```

Update a Ruleset

```
$curl -w "%{http_code}" -u
api_1c2618a67847c94b8:98c76f7a4563f29cd78b3392684cd5ec09534bafe5197fe8e901d9
5561bdd8f5 -X PUT -H 'Content-Type: application/json' -d '{"scopes":
[[{"label": {"href":"/orgs/1/labels/14"}},{"label":{"href":"/orgs/1/labels/
15"}}]]}' https://2x2testvc168.ilabs.io:8443/api/v2/orgs/1/sec_policy/draft/
rule_sets/14 | jq
```

Response

The ruleset was successfully updated:

```
204
```

Rules

This Public Stable API creates, updates, and deletes individual rules in rulesets. It also gets a collection of rules from a ruleset.

Providers and Consumers

The Illumio Core allowlist policy model uses rules to define the allowed communications between two or more workloads or between workloads and other entities, such as IP lists, virtual servers, and the internet.

The fundamental structure of a rule (except custom iptables rules) consists of a provider, a service that the provider makes available over a network port and protocol, and a consumer of that service.

Rules API Methods

Functionality	HTTP	URI
Get rules	`GET`	`sec_policy_rule_sets_sec_rules`
Get rules for provides	`GET`	`sec_policy_rule_sets_sec_rules_providers`
Get rules for consumers.	`GET`	`sec_policy_rule_sets_sec_rules_consumers`
Update rules	`PUT`	`sec_policy_rule_sets_sec_rules`
Update rules for providers	`PUT`	`sec_policy_rule_sets_sec_rules_providers`
Update rules for consumers	`PUT`	`sec_policy_rule_sets_sec_rules_consumers`
Create rules	`POST`	`sec_policy_rule_sets_sec_rules`
Delete an individual rule.	`DELETE`	`sec_rule_href`

Active vs Draft

This API operates on provisionable objects, which exist in either a `draft` (not provisioned) state or an `active` (provisioned) state.

Provisionable items include label groups, services, rulesets, IP lists, virtual services, firewall settings, enforcement boundaries, and virtual servers. For these objects, the URL of the API call must include the element called `:pversion`, which can be set to either `draft` or `active`.

Depending on the method, the API follows these rules:

- For GET operations — `:pversion` can be draft, active, or the ID of the security policy.
- For POST, PUT, DELETE — `:pversion` can be draft (you cannot operate on active items) or the ID if the security policy.

Rule Types

There are three types of rules:

- **Intra-scope rules**: Allow communication between providers and consumers within a specific scope.
- **Extra-scope rules**: Rules that go beyond the scope of the ruleset to which they belong. In this rule type, the workloads, labels or IP list in the consumers part of the rule are not constricted by the scope of the ruleset. This type of rule is used when you want specific rules that allow providers to offer a service to other workloads or groups that are not within the boundaries of the ruleset scope.
- **Custom Iptables rules**: Used to configure custom iptables rules on Linux workloads; for example, to preserve existing native Linux host iptables rules by including them in a ruleset.

NOTE

The PCE web console can only display up to 500 rules per ruleset. To write more than 500 rules for a particular scope, consider splitting the rules across multiple rulesets, otherwise users won't be able to view them all in the PCE web console.

Rule Type JSON Specification

To define a rule as either intra-scope or extra-scope, specify if the rule is “scoped” or “not scoped” by defining the `'unscoped_consumers'` property:

- When a rule has `unscoped_consumers: false`, this defines an intra-scope rule, which means both its providers and consumers are bound by the ruleset scope.
- When a rule has `unscoped_consumers: true`, this defines an extra-scope rule, which means its providers are bound by the ruleset scope, but the ruleset scope does not bind the consumers.

Intra-Scope Rule Example

NOTE

The common schema `consuming_security_principals` has been replaced by two other APIs: `consuming_security_principals_get` and `consuming_security_principals_put`

This rule illustrates an intra-scope rule because it has its `unscoped_consumers` property set to `false`:

```
{
  "rules": [
    {
      "enabled": true,
      "providers": [ {"label": {"href": "/orgs/1/labels/2"} } ],
      "consumers": [ {"label": {"href": "/orgs/1/labels/1"} } ],
      "consuming_security_principals": [],
      "ingress_services": ["href": "/orgs/1/sec_policy/draft/services/
20"],
      "resolve_labels_as": {
        "providers": ["workloads"],
        "consumers": ["workloads"]
      },
      "sec_connect": false,
      "unscoped_consumers": false
    }
  ]
}
```

Stateless Rules

A rule can be configured to have stateless packet filtering (`"stateless": true`). This means that the VEN instructs the host firewall to *not* maintain persistent connections for all sessions. This type of rule is typically used for data center "core services" such as DNS and NTP.

A stateless rule can have these consumer types:

- Any IP list plus all workloads
- A label (one of a specific type)
- An individual item (such as an individual workload)

An attempt to add more consumers, or one not supported, will return an error.

A PCE can only have a maximum of 100 stateless rules. If an implementation requires more than 100 stateless rules, contact your Illumio Professional Services Representative for more information.

NOTE

This property has an API exposure level of

Public Experimental, which means it is not intended

for production use and might change in future releases.

For more information, see API Classification and Version [9].

Get Rules

This API gets a collection of rules or gets an individual rule from a ruleset.

Before you can get rules from a ruleset with this API, you must obtain the ruleset HREF, which is returned when you Get a Collection of Rulesets.

Query Parameters to Get a Collection of Security Rules from a Ruleset

Parameter	Description	Type	Required
`org_id`	Organization	Integer	Yes
`pversion`	Security policy version -- `draft`(not provisioned)	String	Yes
	or `active` (provisioned)		
`rule_set_id`	Ruleset ID	Integer	Yes
`external_da-ta_reference`	A unique identifier within the external data source.	String	No
	For example, if this rule information is stored in an external database.		
`external_data_set`	The data source from which the resource originates.	String	No
	For example, if this rule information is stored in an external database.		
`labels`	List of lists of label URIs, encoded as a JSON string	String	No
`max_results`	Maximum number of Rule Sets to return	Integer	No
`name`	Name of Rule Set(s) to return. Supports partial matches	String	No

Query Parameters to Get an Individual Security Rule from a Ruleset

Parameter	Description	Type	Required
`org_id`	Organization	Integer	Yes
`pversion`	Security policy version -- `draft`(not provisioned)	String	Yes
	or `active` (provisioned)		
`rule_set_id`	Ruleset ID	Integer	Yes

Create Rules

This API allows you to create one or more rules inside a specific ruleset.

URI to Create a Rule

```
POST [api_version][rule_set_href]/sec_rules
```

Properties

Property	Description	Type	Required
`enabled`	Indicates if the rule is enabled or disabled.	Boolean	Yes
`providers`	Entities that can be used as a provider in a rule. Reference to `sec_policy_rule_sets_sec_rules_providers_put.schema.json`		Yes
`consumers`	Entities that can be used as a consumer in a rule. Reference to `sec_policy_rule_sets_sec_rules_consumers_put.schema.json`		Yes
`ingress_services`	Reference to `sec_rule_ingress_services.schema.json`		Yes
`resolve_labels_as`	Reference to `sec_rule_resolve_labels_as.schema.json`		Yes
`sec_connect`	Indicates whether a secure connection is established. If set to true, then the rule will use SecureConnect IPsec encryption for all traffic allowed by the rule.	Boolean	No
`stateless`	Whether packet filtering is stateless for the rule. If set to true, then the rule's packet filtering is stateless. This means that the VEN will instruct the host firewall to not maintain persistent connections for a session. This type of rule is typically used for data center "core services" such as DNS and NTP. You can only create a total of 100 stateless rules in your PCE. If you need more than 100 stateless rules in your Illumio policy, contact your Illumio Professional Services Representative for more information.	Boolean	No
`machine_auth`	Whether machine authentication is enabled. If set to true, machine authentication is used for the rule, meaning that any hosts defined in the rule have been configured for the PKI-based machine authentication. Before using this property, your PCE must be configured for machine authentication. See the PCE Administration Guide for information on configuring machine authentication for the PCE.	Boolean	No
`consuming_security_principals`	Reference to `common/consuming_security_principals_put.schema.json`		
`unscoped_consumers`	Set the scope for rule consumers to All	Boolean	
`network_type`	Reference to `common/rule_network_type.schema.json`		

Property	Description	Type	Required
use_workload_subnets	Reference to sec_rule_use_workload_subnets.schema.json		

Update Rules

This API updates an individual rule inside a ruleset.

URI to Update Rules

```
PUT [api_version][sec_rule_href]
```

The request body and JSON payload is the same as that for Create Rules [126].

Delete a Rule

This API deletes an individual rule inside a ruleset.

URI to Delete a Rule

```
DELETE [api_version][sec_rule_href]
```

Curl Command to Delete Rule

The curl command for deleting a rule can be structured as follows:

```
curl -i -X DELETE https://pce.my-company.com:8443/api/v2/orgs/sec_policy/
draft/rule_sets/152/sec_rules/124 -H "Accept: application/json" -u
$KEY:$TOKEN
```

Rule Search

This Public Experimental method searches for rules across all rulesets. This method is especially useful when your organization has large numbers of rules organized in rulesets. For example, your organization has 192,000 rules organized across 650 rulesets and you needed to know how many rules applied for SNMP (UDP 161). You can't easily find this information without using this method.

NOTE

Rule search concurrent requests are now increased to 12 searches on 2x2s and 4x2s.

URI to Search for Rules

```
POST sec_policy_rule_search
```

Attributes for Rule Search

You can search for `Workloads` and IP lists by `href`. The `ingress_services` field accepts either an HREF or an object containing port/protocol/process name/service name, but not service_ports or windows_services sub-resource.

To search by `providers` and `consumers`, you can using the following attributes:

Actor Name	Actor Value Type	Required Keys	Providers	Consumers
`actors`	String	N/A	True	True
`labels`	JSON Object	HREF	True	True
`label_group`	JSON Object	HREF	True	True
`workload`	JSON Object	HREF	True	True
`virtual_service`	JSON Object	HREF	True	True
`virtual_server`	JSON Object	HREF	True	False
`ip_list`	JSON Object	HREF	True	True

Examples for Rule Search

Curl Command Examples for Rule Search

```
curl -u API_ID:API_SECRET -X POST -H 'Content-Type: application/
json' -d '{"providers": [{"label": {"href": "/orgs/1/labels/
2"}}],"consumers": [{"label": {"href": "/orgs/1/labels/1"}}]}'https://
dev6.ilabs.io:8443/api/v2/orgs/1/sec_policy/draft/rule_search
```

```
curl -u API_ID:API_SECRET -X POST -H 'Content-Type: application/
json' -d '{"providers": [{"workload": {"href": "/orgs/1/workloads/
4ce873d3-2e5d-4f06-82f5-4b1e0ec9ceb2"}}]}'https://dev6.ilabs.io:8443/api/v2/
orgs/1/sec_policy/draft/rule_search
```

```
curl -u API_ID:API_SECRET -X POST -H 'Content-Type: application/
json' -d '{"ingress_services": [{"href": "/orgs/1/sec_policy/draft/services/
1"}]}'https://dev6.ilabs.io:8443/api/v2/orgs/1/sec_policy/draft/rule_search
```

```
curl -u API_ID:API_SECRET -X POST -H 'Content-Type: application/json'
-d '{"ingress_services": [{"port": 11000, "to_port": 12000, "proto":
6}]}'https://dev6.ilabs.io:8443/api/v2/orgs/1/sec_policy/draft/rule_search
```

Examples

Get a Rule

```
$curl -X GET https://pce.my-company.com:8443/api/v2/orgs/1/sec_policy/
active/rule_ sets/ -H "Accept: application/json" -u
```

```
api_1c2618a67847c94b8:98c76f7a4563f29cd78b3392684cd5ec09534bafe5197fe8e901d9
5561bdd8f5| jq
```

Response


```
[
    {
    "href": "/orgs/1/sec_policy/active/rule_sets/1",
    "created_at": "2023-04-05T23:08:32.578Z",
    "updated_at": "2023-04-05T23:08:32.632Z",
    "deleted_at": null, "created_by": {
        "href": "/users/0"
        },
    "updated_by": {
        "href": "/users/0"
        },
    "deleted_by": null,
    "name": "Default",
    "description": null,
    "enabled": true, "scopes": [ []
        ],
    "rules": [
        {
        "href": "/orgs/1/sec_policy/active/rule_sets/1/sec_rules/1",
    "created_at": "2023-04-05T23:08:32.599Z",
    "updated_at": "2023-04-05T23:08:32.632Z",
    "deleted_at": null, "created_by": {
        "href": "/users/0"
        },
    "updated_by": {
        "href": "/users/0"
        },
    "deleted_by": null,
    "description": "Allow outbound connections",
    "enabled": true,
    "providers": [ {
    "ip_list": {
        "href": "/orgs/1/sec_policy/active/ip_lists/1"
        }
        }
    ],
    "consumers": [ {
    "actors": "ams"
        }
        ],
    "consuming_security_principals": [],
    "sec_connect": false,
    "stateless": false,
    "machine_auth": false,
    "unscoped_consumers": false,
    "network_type": "brn",
    "use_workload_subnets": [], "ingress_services": [
        {
        "href": "/orgs/1/sec_policy/active/services/1" }
        ],
```

```
    "egress_services": [],
    "resolve_labels_as": {
    "providers": [
    "workloads"
        ],
    "consumers": [
    "workloads"
        ]
    }
}
],
```

Create a Rule

```
curl -u
api_1c2618a67847c94b8:98c76f7a4563f29cd78b3392684cd5ec09534bafe5197fe8e901d9
5561bdd8f5 -X POST -H 'Content-Type: application/json' -d '{"providers":
[{"label": {"href":"/orgs/1/labels/14"}}],"consumers":[{"label":{"href":"/
orgs/1/labels/15"}}],"enabled":true,"ingress_services":[{"href":"/orgs/1/
sec_policy/draft/services/9"},
{"proto":6,"port":23000}],"network_type":"brn","consuming_security_principal
s":[],"sec_connect":true,"machine_auth":false,"stateless":false,"unscoped_
consumers":false,"description":"","use_workload_subnets":
[],"resolve_labels_as": {"consumers":["workloads"],"providers":
["workloads"]}}' https://2x2testvc168.ilabs.io:8443/api/v2/orgs/1/
sec_policy/draft/rule_sets/3/sec_ rules | jq
```

```
{
    "href": "/orgs/1/sec_policy/draft/rule_sets/3/sec_rules/9",
    "created_at": "2023-04-06T00:58:55.061Z",
    "updated_at": "2023-04-06T00:58:55.088Z",
    "deleted_at": null, "created_by": {
        "href": "/users/1"
        },
    "updated_by": {
        "href": "/users/1"
        },
    "deleted_by": null,
    "update_type": "create",
    "description": "",
    "enabled": true, "providers": [
        {
        "label": {
            "href": "/orgs/1/labels/14"
        },
        "exclusion": false
            }
            ],
    "consumers": [
        {
        "label": {
            "href": "/orgs/1/labels/15"
        },
        "exclusion": false
        }
    ],
```

```
    "consuming_security_principals": [],
        "sec_connect": true,
        "stateless": false,
        "machine_auth": false,
        "unscoped_consumers": false,
        "network_type": "brn",
    "use_workload_subnets": [], "ingress_services": [
        {
        "href": "/orgs/1/sec_policy/draft/services/9"
        }, {
            "port": 23000,
            "proto": 6
            }
            ],
    "egress_services": [],
    "resolve_labels_as": {
    "providers": [
        "workloads"
        ],
    "consumers": [
        "workloads"
        ]
    }
}
```

Update a Rule

```
curl -w "%{http_code}" -u
api_1c2618a67847c94b8:98c76f7a4563f29cd78b3392684cd5ec09534bafe5197fe8e901d9
5561bdd8f5 -X PUT -H 'Content-Type: application/json' -d '{"providers":
[{"exclusion":false,"label":{"href":"/orgs/1/labels/14"}}],"consumers":
[{"exclusion":false,"label":{"href":"/orgs/1/labels/
15"}}],"enabled":true,"ingress_services":[{"href":"/orgs/1/sec_policy/draft/
services/9"},
{"proto":6,"port":25000}],"network_type":"brn","consuming_security_principal
s": [],"sec_connect":true,"machine_auth":false,"stateless":false,"unscoped_
consumers":false,"description":"","use_workload_subnets":
[],"resolve_labels_as":{"providers":["workloads"],"consumers":
["workloads"]}}' https://2x2testvc168.ilabs.io:8443/api/v2/orgs/1/
sec_policy/draft/rule_sets/3/sec_ rules/3 | jq
```

Response

The rule was successfully uodated:

```
204
```

Custom iptables Rules

This Public Stable API allows you to leverage preexisting iptables rules on Linux workloads and add them as rules to rulesets.

You can use the rules API to create custom iptables rules in situations where your Linux workloads have preexisting iptables rules configured that you would like to keep in addition to rules you create using Illumio Core.

If you configured iptables on Linux workloads before using Illumio Core, when you pair a workload, the VEN assumes control of the iptables to enact policy and disables any pre-programmed iptables. To solve this, you can use the Rules API to leverage your own iptables rule configurations in a ruleset.

Custom iptables Rules

These terms clarify the relationship between your iptables rules and Illumio Core rules:

- **Iptables**: Linux host configuration before the VEN is installed
- **Rules**: Configurations in the PCE that define the allowed communication between two or more workloads or other entities (IP lists, labels representing multiple workloads, and label groups)
- **Custom iptables rules**: PCE rules that leverage your iptables rule configurations that get programmed on your workloads by the VEN and managed by the PCE

How Custom iptables Rules Work

Custom iptables rules in the PCE consist of a list of predefined iptables statements and the entities that receive the rule definitions. Each rule can have a list of iptables configurations, which allows you to group a sequence of rules for a specific function. Custom iptables rules are programmed after the Illumio PCE generates the iptables rules and they are provisioned.

Before custom iptables rules are sent to the VEN, they are checked for any unsupported tokens (such as names of firewall chains already in use by Illumio, matching against IP sets, and semicolons). If an unsupported token is included, the rule cannot be saved or provisioned.

If the VEN fails to apply a custom iptables rule because of a missing package or an incorrectly formatted rule:

- Error is reported to the PCE and is logged as two audit events:
  "Firewall config failure" (`fw_config_failure`) and
  "Failed to apply policy changes" (`policy_deploy_failed`).
- The error is displayed in the VEN health status.
- The new policy is not used and the last known successful policy is used instead.

For policy distribution and enforcement, the VEN creates a custom chain that contains the rules for each table or chain in the iptables. Each custom chain is appended to the end of its corresponding chain in the correct table. When the VEN requests the policy, the `iptables` command is sent, including where the chain should be placed.

For security reasons, custom iptables rules only support rules in the `mangle`, `nat`, and `filter` tables.

The following table describes the permitted actions for each iptables type:

Table Name	Chain Names	Custom Rules
raw	prerouting, output	No
mangle	prerouting, input, output, forward, postrouting	Yes
nat	prerouting, output, postrouting	Yes
filter	input, output, forward	Yes
security	input, output, forward	No

Create a Custom iptables Rule

This method allows you to create a rule that can contain custom iptables.

Create a Custom iptables Rule

```
POST [api_version/[rule_set_href]/sec_rules
```

Query Parameters

Parameter	Description	Type	Required
name	Ruleset name (must be unique)	String	Yes
scopes	Scope for ruleset, which consists of a list of labels, with each list having at least one application, environment, and/or location label	Array	Yes
external_data_set	External data set identifier	String	No
external_data_reference	External data reference identifier	String	No
enabled	Whether the ruleset is enabled or not	Boolean	Yes
rules	Standard (non-iptables) rules	String	Yes
iptables_rules	Rules that use iptables (see following table for properties)	String	Yes

Custom iptables_rules Properties

Property	Description	Type	Required
`enabled`	Whether the rule is currently enabled	Enum	Yes
`ip_version`	Whether IPv4 or IPv6 is used	String	Yes
`description`	Description of ruleset	String	No
`actors`	Entities that receive the ruleset.	String	Yes
`statements`	Rules for iptables (table, chain name, and parameters), which consist of the following elements: • `table_name`: Name of iptables table, which is `nat`, `mangle`, or `filter` • `chain_name`: Name of iptables chain, which is `prerouting`, `input`, `output`, `forward`, or `postrouting` • `parameters`: Remaining iptables rules (excluding table name and chain name)	String	Yes

For more information on rules, see Rulesets. [111]

Request Body

In this example, a ruleset named `test_ipt_rs` is created that contains two iptables rules.

NOTE
Each iptables rule can contain multiple statements.

```
{
    "name": "test_ipt_rs",
    "enabled": true,
      "scopes": [
    [
      { "label": { "href": "/orgs/1/labels/24" } },
      { "label": { "href": "/orgs/1/labels/27" } },
      { "label": { "href": "/orgs/1/labels/21" } }
    ],
  ],
    "ip_tables_rules": [
        {
            "enabled": true,
            "actors": [{"label": { "href": "/orgs/1/labels/11" }}],
            "statements": [
                {
                    "table_name": "mangle",
                    "chain_name": "PREROUTING",
                    "parameters": "-i eth0 -p tcp --dport 2222 -j MARK --
set-mark 2222"
                },
```

```
                {
                    "table_name": "nat",
                    "chain_name": "PREROUTING",
                    "parameters": "-i eth0 -p tcp -m mark --mark 2222 -j
REDIRECT --to-port 3333"
                },
                {
                    "table_name": "filter",
                    "chain_name": "INPUT",
                    "parameters": "-i eth0 -p tcp -m mark --mark 2222 -j
ACCEPT"
                }
            ],
            "ip_version": "4"
        },
        {
            "enabled": true,
            "actors": [{ "actors": "ams" }],
            "statements": [
                {
                    "table_name": "nat",
                    "chain_name": "POSTROUTING",
                    "parameters": "-o eth1 -s 192.0.2.10! -d
198.51.100.0/24 -j MASQUERADE"
                }
            ],
            "ip_version": "4"
        }
    ]
}
```

Create Custom Iptables Rule

```
curl -i -X POST https://pce.my-company.com:8443/api/v2/orgs/2/
sec_policy/draft/rule_sets -H "Content-Type:application/json"
-u $KEY:$TOKEN-d '{"name":"test_ipt_rs","enabled":true,"scopes":[{[],
[]}],"ip_tables_rules":[{"enabled":true,"actors":[{"label":{"href":"/orgs/1/
labels/11"}}],"statements":
[{"table_name":"mangle","chain_name":"PREROUTING","parameters":"-i eth0
-p tcp --dport 2222 -j MARK --set-mark 2222"},
{"table_name":"nat","chain_name":"PREROUTING","parameters":"-i eth0 -p
tcp -m mark --mark 2222 -j REDIRECT --to-port 3333"},
{"table_name":"filter","chain_name":"INPUT","parameters":"-i eth0 -p tcp -m
mark --mark 2222 -j ACCEPT"}], "ip_version":"4"},{"enabled":true,"actors":
[{"actors":"ams"}],"statements":[{"table_name":"nat",
"chain_name":"POSTROUTING","parameters":"-o eth1 -s 10.0.0.2 ! -d
172.17.0.0/16 -j MASQUERADE"}], "ip_version":"4"}]}'
```

Response Body

Property	Description	Type
`href`	Identifier for the resource	String

Response


```
{
  "href": "/orgs/1/sec_policy/draft/rule_sets/17",
  "created_at": "2023-02-24T23:19:01.020Z",
  "updated_at": "2023-02-24T23:19:01.020Z",
  "deleted_at": null,
  "created_by": {
    "href": "/users/1"
  },
  "updated_by": {
    "href": "/users/1"
  },
  "deleted_by": null,
  "name": "test_ipt_rs",
  "description": null,
  "enabled": true,
  "scopes": [
    [
      { "label": { "href": "/orgs/1/labels/24" } },
      { "label": { "href": "/orgs/1/labels/27" } },
      { "label": { "href": "/orgs/1/labels/21" } }
    ],
    [
      { "label": { "href": "/orgs/1/labels/15" } },
      { "label": { "href": "/orgs/1/labels/16" } },
      { "label": { "href": "/orgs/1/labels/17" } }
    ]
   ],
  ],
  "rules": [],
  "ip_tables_rules": [
    {
      "href": "/orgs/1/sec_policy/draft/rule_sets/17/ip_tables_rules/20",
      "created_at": "2023-02-24T23:19:01.280Z",
      "updated_at": "2023-02-24T23:19:01.280Z",
      "deleted_at": null,
      "created_by": {
        "href": "/users/1"
      },
      "updated_by": {
        "href": "/users/1"
      },
      "deleted_by": null,
      "description": null,
      "enabled": true,
      "actors": [
        {
          "actors": "ams"
        }
      ],
      "ip_version": "4",
      "statements": [
        {
          "table_name": "nat",
```

```
          "chain_name": "POSTROUTING",
          "parameters": "-o eth1 -s 192.0.2.0 ! -d 198.51.100.0/24 -j
MASQUERADE"
        }
      ]
    },
    {
      "href": "/orgs/1/sec_policy/draft/rule_sets/17/ip_tables_rules/18",
      "created_at": "2023-02-24T23:19:01.229Z",
      "updated_at": "2023-02-24T23:19:01.229Z",
      "deleted_at": null,
      "created_by": {
        "href": "/users/1"
      },
      "updated_by": {
        "href": "/users/1"
      },
      "deleted_by": null,
      "description": null,
      "enabled": true,
      "actors": [
        {
          "label": {
            "href": "/orgs/1/labels/11",
            "key": "loc",
            "value": "test"
          }
        }
      ],
      "ip_version": "4",
      "statements": [
        {
          "table_name": "filter",
          "chain_name": "INPUT",
          "parameters": "-i eth0 -p tcp -m mark --mark 2222 -j ACCEPT"
        },
        {
          "table_name": "nat",
          "chain_name": "PREROUTING",
          "parameters": "-i eth0 -p tcp -m mark --mark 2222 -j REDIRECT
--to-port 3333"
        },
        {
          "table_name": "mangle",
          "chain_name": "PREROUTING",
          "parameters": "-i eth0 -p tcp --dport 2222 -j MARK --set-mark
2222"
        }
      ]
    }
  ]
}
```

Machine Authentication

This Public Experimental API allows you to configure unmanaged workloads and rules for machine authentication in case you configured the PCE to use machine authentication.

Before you start writing rules, you need to complete the following tasks:

- Configure an unmanaged (no VEN) workload that you want to use machine authentication on with the client certificate X.509 Subject distinguished name (`distinguished_name`) issued from the CA. You do not need to set this property if you are using machine authentication with managed workloads (with VENs installed).
- Configure rules for machine authentication by setting the `machine_auth` flag to true on each rule. You can also optionally set SecureConnect (`sec_connect`) if you want the traffic data to be encrypted using IPsec.

Once you have done these two tasks, you can use these unmanaged workloads in machine authentication-based rules.

Configure Machine Authentication

The machine authentication workload property for the certificate distinguished name is required for those hosts or systems where you have not installed a VEN, such a laptop or other server whose IP address is unknown or changes often.

You can set the `distinguished_name` when you first create (POST) the unmanaged workload, which is passed in the JSON request payload.

NOTE

For information on creating an unmanaged workload, see Create an Unmanaged Workload. [269]

URI to Configure Machine Authentication on an Unmanaged Workload

Use this URI to configure machine authentication when you create a new unmanaged workload:

```
POST [api_version][org_href]/workloads
```

If you want to enable machine authentication on an existing unmanaged workload, you need to know the workload HREF, which can be obtained from the command GET on a collection of Workloads.

The workload HREF is highlighted in blue:

```
/orgs/7/workloads/XXXXXXX-9611-44aa-ae06-fXXX8903db65
```

Use this URI to configure machine authentication for an existing unmanaged workload:

```
PUT [api_version][workload_href]
```

Request Parameter

Parameter	Description
`distinguished_name`	The X.509 Subject distinguished name is used if you want this unmanaged workload to use machine authentication when communicating with other hosts.

Request Body

```
{
   "distinguished_name": "CN=ACCVRAIZ1, OU=PKIACCV, O=ACCV, C=ES"
}
```

Curl Command Enable Machine Authentication

```
curl -i -X PUT https://pce.my-company.com/api/v2/orgs/7/workloads/
XXXXXXX-9611-44aa-ae06-fXXX8903db65 -H "Content-Type:application/json" -u
$KEY:$TOKEN -d '{"distinguished_name": "CN=ACCVRAIZ1, OU=PKIACCV, O=ACCV,
C=ES"}'
```

Configure Machine Authentication on Rule

For a rule to use machine authentication, you need to configure it on the rule when you create or update it.

URI to Configure Machine Authentication for a Rule

Use this URI to configure machine authentication for a new rule:

```
POST [api_version][rule_set_href]/sec_rules
```

If you want to enable machine authentication on an existing rule, you need to know the HREF of the rule. For example:

```
/orgs/3/sec_policy/draft/rule_sets/152/sec_rules/124
```

Use this URI to configure machine authentication for an existing rule:

```
PUT [api_version][sec_rule_href]
```

Request Parameters

Parameter	Description
machine_auth	An optional boolean flag is used to enable machine authentication for the rule. When set to true, machine authentication is enabled for the rule.
sec_connect	An optional boolean flag is used to enable SecureConnect (host-to-host traffic encryption) for the rule.

Request Body

This example shows the JSON payload for updating a rule to enable machine authentication but with SecureConnect disabled.

```
{
    "providers": [{"label": {"href": "/orgs/1/labels/1"}}],
    "sec_connect": false,
    "consumers": [{
        "actors": "ams"
    }],
    "consuming_security_principals": [],
    "unscoped_consumers": false,
    "description": "",
    "ingress_services": [{"proto": 6}],
    "resolve_labels_as": {
      "providers": ["workloads"],
      "consumers": ["workloads"]
    },
    "enabled": true,
    "machine_auth": true
}
```

Configure Machine Authentication for Rule

```
curl -i -X PUT https://pce.my-company.com/api/v2/
orgs/1/sec_policy/draft/rule_sets/152/sec_rules/124 -H "Content-
Type:application/json" -u $KEY:$TOKEN -d '{"providers":
["{"label": {"href":"/orgs/1/labels/1"}}], "sec_connect":false,
"consumers":[{"actors":"ams"}],"consuming_security_principals":[],
"ingress_services": [{"proto": 6}], unscoped_consumers":false,
"description":","resolve_labels_as":{"providers":["workloads"],"consumers":
["workloads"]},"enabled":true,"machine_auth":true}'"consumers":
[{"actors":"ams"}],"consuming_security_principals":[], "ingress_services":
[{"proto": 6}], unscoped_consumers":false,
"description":","resolve_labels_as":{"providers":["workloads"],"consumers":
["workloads"]},"enabled":true,"machine_auth":true}'
```

Enforcement Boundaries

In the Illumio Core 21.2.0 release, Illumio introduced Enforcement Boundaries, a new feature to speed your journey toward Zero Trust.

The Illumio security policy model is based on the principle of Zero Trust. Achieving Zero Trust security is possible with Illumio Core because it bases security policy on an allowlist model.

From a security perspective, creating a policy based on allowlists is the preferred method and has the advantage of specifying what you trust explicitly. However, you can encounter situations when you need more flexibility in segmenting your data centers. The solution is introducing a new set of rules that determine where segmentation rules apply. These rules are referred to as Enforcement Boundaries in Illumio Core.

Enforcement Boundaries can block traffic from communicating with workloads you specify, while still allowing you to progress toward a Zero Trust environment.

For more information about deploying Enforcement Boundaries in your data center, see Policy Enforcement in Security Policy Guide.

Selective Enforcement vs. Enforcement Boundaries

For a description of all changes due to Enforcement Boundaries, see Enforcement Boundaries in the "Illumio Core REST API in 21.2" in What's New in This Release.

Documentation Update: In Illumio Core 21.2, this topic for Enforcement Boundaries replaces the Illumio Core 20.2.0 topic for Selective Enforcement.

The APIs with the endpoints `enforcement_boundaries` replace the APIs with the endpoints `selective_enforcement_rules`. Specifically, the APIs for Enforcement Boundaries replace the APIs used for Selective Enforcement as follows:

- `sec_policy_selective_enforcement_rules_get.schema.json` has been replaced with `sec_policy_enforcement_boundaries_get.schema.json`
- `sec_policy_selective_enforcement_rules_post.schema.json` has been replaced with `sec_policy_enforcement_boundaries_post.schema.json`
- `sec_policy_selective_enforcement_rules_put.schema.json` has been replaced with `sec_policy_enforcement_boundaries_put.schema.json`

Changes to the Policy Modes

In addition to the changes for Enforcement Boundaries, the policy modes changed in Illumio Core 20.2.0 and later releases in the following ways.

The existing common schema `workload_modes.schema.json` is DEPRECATED:

```
{
    "$schema": "http://json-schema.org/draft-04/schema#",
    "description": "DEPRECATED AND REPLACED (Use enforcement_mode instead)",
    "type": "string",
    "enum": ["idle", "illuminated", "enforced"]
}
```

The common `workload_enforcement_mode.schema.json` is added.

```
{
    "$schema": "http://json-schema.org/draft-04/schema#",
```

```
    "description": "Workload enforcement mode",
    "type": "string",
    "enum": ["idle", "visibility_only", "full", "selective"]
}
```

The following list compares the policy modes in Illumio Core 20.2.0 to 21.2.0:

- `idle` is the same
- `illuminated` (build, test) = `visibility_only`
- `enforced` = `full`
- `selective`: Added by `workload_enforcement_mode.schema.json`

Enforcement Boundaries in the REST API

The RBAC roles Global Org Owner and Global Admin can manage Enforcement Boundaries without restrictions.

You can only use Enforcement Boundaries with managed workloads. You cannot apply Enforcement Boundaries to NEN-controlled or other unmanaged workloads.

One or more ports on a workload are enforced ("port enforcement"), leaving the remaining ports unenforced. Instead of configuring workloads directly, enforcement is controlled using policies.

Workloads have to be placed in `selective` mode when using Enforcement Boundaries. Therefore, to use an Enforcement Boundary, you need to perform two separate configurations:

- Set the workload policy state to `selective`.
- Create security policy with a scope that includes the workload.

Enforcement Boundaries Methods

Functionality	HTTP	URI
View the configured enforcement boundaries.	`GET`	`[api_version][org_href]/sec_policy/:version/enforcement_boundaries:/id`
Edit the specified enforcement boundary.	`PUT`	`[api_version][org_href]/sec_policy/:version/enforcement_boundaries/:id`
Create a new enforcement boundary.	`POST`	`[api_version][org_href]/sec_policy/:version/enforcement_boundaries`
Delete the specified enforcement boundary.	`DELETE`	`[api_version][org_href]/sec_policy/:version/enforcement_boundaries/:id`

Enforcement Boundaries Parameters

Parameter	Method	Description	Type	Required
org_id	GET, PUT, POST, DELETE	Organization ID	Integer	Yes
pversion	GET, PUT, POST, DELETE	Security Policy Version	String	Yes
labels	GET	List of lists of label URIs, encoded as a JSON string	String	No
max_results	GET	Maximum number of Rule Sets to return	Integer	No
name	GET	Filter by name supports partial matching	String	No
service	GET	Service URI	String	No
service_ports.port	GET	Specify port or port range to filter results. The range is from -1 to 65535.	String	No
service_ports.proto	GET	Protocol to filter on	Integer	No
enforcement_boundary_id	PUT	Enforcement boundary ID	Integer	Yes

Enforcement Boundaries Properties

Property	Method	Description	Type	Required
`href`	`GET`	URI of the selective enforcement rule	String	Yes
`name`	`GET, PUT, POST`	Name of the selective enforcement rule	String	Yes

`providers`	`GET, PUT, POST`	`label`
		.....Label URI. Required parameter is `href`.
		`label_group`
		.....Label group URI. Required parameter is `href`.
		`ip_list`
		.....IP List URI. Required parameter is `href`.
		`actors`
		.....Label group URI. Required parameter is `href`.
			Array	Yes

`consumers`	`GET, PUT, POST`	`label`
		.....Label URI. Required parameter is `href`.
		`label_group`
		.....Rule actors are all workloads ('ams').
		`ip_list`
		.....IP List URI. Required parameter is `href`.
		`actors`
		.....Rule actors are all workloads ('ams').
			Array	Yes

`ingress_services`	`GET, PUT, POST`	Collection of services that are enforced `port`: Port number, or the starting port of a range. If unspecified, this will apply to all ports for the given protocol. minimum: 0, maximum: 65535 `to_port`: Upper end of port range; this field should not be included if specifying an individual port.	Array	Yes

Property	Method	Description	Type	Required
		minimum: 0, maximum: 65535 `proto`: Transport protocol (numeric) enum: 6,17		
`created_at`	`GET`	Timestamp when this Enforcement Boundary was first created. Format `date-time`	String date/time	No
`updated_at`	`GET`	Timestamp when this Enforcement Boundary was last updated. Format `date-time`	String date/time	No
`deleted_at`	`GET`	Timestamp when this Enforcement Boundary was deleted	String date/time	No
`created_by`	`GET`	The user who originally created this Enforcement Boundary Required parameter `href`.	String	No
`updated_by`	`GET`	The user who last updated this Enforcement Boundary Required parameter `href`.	String	No
`deleted_by`	`GET`	The user who deleted this Enforcement Boundary Required parameter `href`.	String	No
`update_type`	`GET`	Type of Update	String	No
`enabled`	`POST`, `PUT`	For `POST`: The optional `enabled` boolean field can be provided in the payload. If it is not provided, the newly created enforcement boundary object is enabled by default. For `PUT`: The optional boolean value for the enabled field in the payload is: `"enabled": true`	Boolean	No

Get Enforcement Boundaries

```
curl -i -X GET https://pce.my-company.com:8443/api/v2/orgs/1/sec_policy/
draft/enforcement_boundaries -H "Accept: application/json" -u $KEY:$TOKEN
```

Response

In this response, the former scope property was replaced with providers, and another property consumer was added. The required properties are: name, providers, consumers, and `ingress_services`(formerly `enforced_service`).


```
{
    "href":"/orgs/1/sec_policy/draft/enforcement_boundaries/1",
    "created_at":"2021-09-21T21:48:40.228Z",
    "updated_at":"2021-09-21T21:48:40.241Z",
    "deleted_at":null,
    "created_by":{
        "href":"/users/1"
    },
    "updated_by":{
        "href":"/users/1"
                },
    "deleted_by":null,
    "update_type":"create",
    "name":"Dev to Prod separation",
    "providers":[
        {
            "label":{
                "href":"/orgs/1/labels/7",
                "key":"env",
                "value":"Production"
            }
        }
    ],
    "consumers":[
        {
            "label":{
                "href":"/orgs/1/labels/9",
                "key":"env",
                "value":"Development"
            }
        }
    ],
    "ingress_services":[
        {
            "href":"/orgs/1/sec_policy/draft/services/1",
            "created_at":"2021-09-21T16:31:16.266Z",
            "updated_at":"2021-09-21T16:31:16.292Z",
            "deleted_at":null,
            "created_by":{
                "href":"/users/0"
            },
            "updated_by":{
                "href":"/users/0"
            },
            "deleted_by":null,
            "update_type":null,
            "name":"All Services",
            "service_ports":[
                {
                    "proto":-1
                }
```

```
            ]
        }
    ],
    "caps":[
        "write",
        "provision"
    ],
    "workload_counts":{

    }
}
```

Create Enforcement Boundaries

```
curl -i -X POST https://pce.my-company.com:8443/api/v2/orgs/1/sec_policy/
draft/enforcement_boundaries -H "Content-Type: application/json" -u
$KEY:$TOKEN -d '{"name": "eb1", "providers": [{"actors": "ams"}],
"consumers": [{"actors": "ams"}], "ingress_services": [{"port": 1, "proto":
6}]}'
```

Edit Enforcement Boundaries

```
curl -i -X PUT https://pce.my-company.com:8443/api/v2/orgs/1/sec_policy/
draft/enforcement_boundaries/1 -H "Content-Type: application/json" -u
$KEY:$TOKEN -d '{"name": "a4"}'

{
    "name": "a name here",
    "providers": [
        {"label": "/orgs/1/labels/13"},
        {"label": "/orgs/1/labels/15"},
        {"ip_list": "/orgs/1/sec_policy/draft/ip_lists/22"}
    ],
    "consumers": [
        {"actors": "ams"}
        ],
    "ingress_services": [
        {"href": "/orgs/1/sec_policy/draft/services/20"},
        {"port": 22, "proto": 6},
        {"port": 8080, "to_port": 8088, "proto": 6}
    ]
}
```

RBAC for PCE Users

As an Illumio administrator, use the Role-based Access Control (RBAC) API to assign privileges and responsibilities to users as follows:

- Establish the least required privileges to perform a job.
- Limit access to the smallest operation set to perform a job.
- Separate users' duties, such as giving responsibility or delegating authority to a specific team.
- Allow access based on roles and scopes. Scopes in the Illumio Core specify the domain boundaries granted to a user.
- Manage user authentication and authorization.

RBAC Overview

Role-based Access Control (RBAC) is an API that creates, updates or deletes permissions for users and groups. These users and groups are managed locally by the PCE or externally by a single sign-on (SSO) identity provider (IdP).

RBAC Terms and Concepts

Become familiar with the following RBAC concepts before using this API.

User

A user is a PCE account that provides login or API access to the PCE. A user can be managed locally by the PCE or externally through an IdP.

Permission

A permission represents a combination of a user's account, an RBAC role, and an optional scope. You can grant multiple permissions to a user, depending on your requirements. A permission is a three tuple consisting of a role, a scope, and an authorization security principal:

- **Role**: User personas associated with a set of allowed operations, such as creating new labels or provisioning policy changes. Roles can be one of two general types: unscoped and scoped.
- • **Unscoped roles** (or roles with "global scopes") do not restrict the types of resources a user can operate. This means that the role is not affected by any label scopes.
  - **Scoped roles** use one or more unique application, environment, and location labels (each with a label HREF, key, and value) to restrict user or group permissions to only those objects that share the same labels. Specifically, scoped roles allow certain users to create and provision rules and rulesets.
- **Scope**: A set of three labels (one of each type for Application, Environment, and Location) that restricts operations to those workloads sharing the same labels as the scope label set.
  - GET, POST, and PUT permissions methods for the Ruleset Manager (limited or full) or Ruleset Provisioner roles have a required scope parameter. When granting permissions,

choose a scope restricting which resources these users can use in a ruleset or which resources they can provision.
  - A scope contains zero or more applications, environment, and location labels. Each label in the scope is identified by its HREF. A scope can also contain zero or more label groups.
  - If the scope is an empty array (`[]`), it includes all applications, environments, and locations.
  - If one of the label types is not specified, all instances of that type are permitted. For example, all applications are within the scope if application labels are omitted but environment and location labels are present.
- **Authorization Security Principal**: The binding that connects a user account with its permissions (a role, and depending on the role, scopes).

NOTE

If you are using an external identity provider to manage user access to the PCE, make sure that your identity provider is configured and those external users have been added to the PCE *before* you use this API to assign user permissions.

Grant Permissions Workflow

Granting user permissions with the REST API follows this general workflow:

1. **Create a local user (optional)**
   This step creates a new local PCE user with no permissions and sends an e-mail invitation to the user's e-mail address. (If you use an external identity provider to manage user access to the PCE, skip this step.)
2. **Create an authorization security principal.**
   An authorization security principal is binding between a user or group, an RBAC role, and optional scopes.
3. **Grant permissions by assigning a role and scope to the authorization security principal**
   Once a user account has been associated with an authorization security principal, you can assign an RBAC role to the account and add custom scopes if the user role requires them.

List User Roles and Role Names

The APIs GET roles and GET `role_name` have been promoted from Internal to Public Experimental.

They allow users to list roles and role names.

Functionality	HTTP	URI
Get the roles in the organization.	`GET`	`[api_version] /orgs/:xorg_id/roles`
Get information for this role name.	`GET`	`api_version]/orgs/:xorg_id/roles/:role_name`

RBAC User Operations

This Public Stable API creates, updates, re-invites local users, and converts user status (a local user to an external user or an external user to a local user). This API is intended only for local users managed by the PCE, not users managed by an external identity provider (IdP).

API Methods

Functionality	HTTP	URI
Get a collection of users.	`GET`	`[api_version]/users`
GET an individual user	`GET`	`[user_href]`
Get all the orgs the user has accessed after logging in *(this endpoint is Public Experimental)*	`GET`	`[api_version][user_href]/orgs`
Create a local user and send an e-mail invitation.	`POST`	`[api_version]/users`
Convert an external user to a local user.	`POST`	`[user_href]local_profile`
Delete a local user and convert to an external user.	`DELETE`	`[user_href]local_profile`
Re-invite a local user	`PUT`	`[user_href]local_profile/reinvite`
For authenticated users: change your password by sending a request to the agent service.	`PUT`	`[user_href]local_profile/password`

Parameters for RBAC Users

Property	Description	Type	Required
`type`	Indicates that the user created is a `local` user managed by the PCE.	String	No
`id`	User ID	Integer	Yes

Properties for RBAC Users

Property	Description	Type	Required
`href`	User URI	String	Yes
`username`	Identify a local user by an e-mail address, which must meet these requirements: • Be unique • Use the format xxxx@yyyy.zzz • Be 255 characters or less	String (email)	Yes
`last_login_on`	This is populated automatically after a login	String	Yes
`last_log-in_ip_address`	This is populated automatically after a login	String	Yes
`login_count`	Number of times this user logged in	Integer	Yes
`full_name`	User's full name	String	Yes
`time_zone`	Time Zone IANA Region Name	String	Yes
`type`	User's type, i.e., user authenticated locally or remotely via SAML	String	Yes
`updated_at`	Timestamp when this user was last updated	String	Yes
`created_at`	Timestamp when this user was first created	String	Yes
`current_password`	The current password that you want to change	String	Yes
`new_password`	A new password to set	String	Yes

RBAC Users

Get RBAC Users

These methods get a collection of users or an individual user in the organization.

By default, the maximum number of users returned from a GET collection is 500. If you want to get more than 500 users, use an Asynchronous GET Collection.

URI to Get a Collection of Local Users

```
GET [api_version]/users
```

URI to Get an Individual User

```
GET [user_href]
```

Curl Command Get Collection of Local Users

```
curl -i -X GET https://pce.my-company.com:8443/api/v2/users?type=local -H
"Accept: application/json" -u $KEY:$TOKEN
```

Response

```
[
    {
        "href": "/users/99",
        "type": "local",
        "effective_groups": [],
        "id": 99,
        "username": "joe.user@example.com",
        "full_name": "Joe User",
        "time_zone": "America/Los_Angeles",
        "locked": false,
        "login_count": 1,
        "last_login_ip_address": "192.x.x.x",
        "last_login_on": "2016-03-11T08:19:17.587Z",
        "local_profile": { "pending_invitation": false },
        "created_at": "2016-03-08T20:58:05.882Z",
        "updated_at": "2016-03-11T08:19:17.588Z"
    }
.....................................................................
    {
        "href": "/users/56",
        "type": "local",
        "effective_groups": [],
        "id": 56,
        "username": "jeff.user@example.com",
        "full_name": "Jeff User",
        "time_zone": "America/New_York",
        "locked": false,
        "login_count": 21,
        "last_login_ip_address": "192.x.x.x",
        "last_login_on": "2017-05-26T14:22:37.643Z",
        "local_profile": { "pending_invitation": true },
        "created_at": "2016-05-02T07:16:21.725Z",
        "updated_at": "2017-05-26T14:23:04.625Z"
    }
]
```

Pending Invitation

Users with `"pending_invitation": "true"` in the response have not yet accepted the invitation to log in and create an account.

```
{
    "href": "/users/56",
    "type": "local",
    "effecve_groups": [],
    "id": 56,
    "username": "jeff.user@example.com",
    "full_name": "Jeff User",
    "time_zone": "America/New_York",
```

```
    "locked": false,
    "login_count": 21,
    "last_login_ip_address": "192.x.x.x",
    "last_login_on": "2017-05-26T14:22:37.643Z",
    "local_profile": { "pending_invitation": true },
    "created_at": "2016-05-02T07:16:21.725Z",
    "updated_at": "2017-05-26T14:23:04.625Z"
}
```

Create a Local User

This method creates local users who are managed by the PCE.

URI to Create a Local User

```
POST [api_version]/users
```

Request Body

```
{
  "username": "joe_user@mycompany.com",
  "display_name": "Joe User ",
  "type": "local"
}
```

Curl Command to Create a Local User

```
curl -i -X POST https://pce.my-company.com:8443/api/v2/users -H
"Content-Type: application/json" -u $KEY:$TOKEN -d '{"username":
"joe_user@mycompany.com","display_name": "Joe User","type": "user"}'
```

User Profiles

Change a user's status by converting a local user to an external user or an external user to a local user.

Convert Local to External User

This method converts a local user to an external user by *deleting* the local user account profile.

Use the user HREF, obtained from the response when a user logs into the PCE using the Login API or from the GET collection response.

For example: `/users/14`

URI to Convert a Local User to an External User

```
DELETE [user_href]/local_profile
```

Example

```
DELETE https://pce.my-company.com:8443/api/v2/users/14/local_profile
```

Convert Local User to External User

```
curl -i -X >DELETE https://pce.my-company.com:8443/api/v2/users/14/
local_profile -H "Accept: application/json" -u $KEY:$TOKEN
```

Convert External User to Local User

This method converts externally managed users to local users who are managed by the PCE.

URI to Convert an External User a Local User

```
POST [user_href]/local_profile
```

Example

```
POST https://pce.my-company.com:8443/api/v2/users/14/local_profile
```

Curl Command Convert External User to Local User

```
curl -i -X POST https://pce.my-company.com:8443/api/v2/users/14/
local_profile -H "Content-Type: application/json" -u $KEY:$TOKEN
```

Re-invite a Local User

If you have already created a local user, but that user has not logged in yet for the first time, you can use this method to resend the email invitation. Once they receive the invitation, they can log into the PCE and complete their PCE user account registration.

URI to Re-invite a Local User

```
PUT [user_href]/local_profile/reinvite
```

Example

```
PUT https://pce.my-company.com:8443/api/v2/users/14/local_profile/reinvite
```

Curl Command to Re-invite a Local User

```
curl -i -X PUT https://pce.my-company.com:8443/api/v2/users/14/
local_profile/reinvite -H "Content-Type: application/json" -u $KEY:$TOKEN
```

RBAC Permissions

This Public Experimental API grants permissions to PCE users and groups. It also returns a collection of permissions in the organization, gets individual user permissions, and updates and deletes permissions.

NOTE

In addition to labels, label groups have been added as part of the response and parameters because they are now supported in user scopes.

API Methods

Functionality	HTTP	URI
Get a list of all RBAC permissions for the organization (schema and query parameter format change)	`GET`	`[api_version]orgs/{org_id}/permissions`
Get an individual permission (schema change)	`GET`	`[api_version]{org_id}/permissions/{permission_id}`
Grant a permission (schema change)	`POST`	`[api_version]orgs/{org_id}/permissions`
Update a permission (schema change)	`PUT`	`[api_version]orgs/{org_id}/permissions/{permission_id}`

New Schema and Query Parameter

For the above endpoints, the `org_scope.schema.json` is now used instead of `labels_summary.schema.json` and `labels.schema.json`.

For the endpoint `GET /api/v2/orgs/1/permissions`, the query parameter is changed from

```
scope: ["/orgs/1/labels/5", "/orgs/1/labels/3"]
```

to

```
scope: [{"label":{"href":"/orgs/1/labels/5"}},{"label":{"href":"/orgs/1/labels/3"}}]
```

Parameters for Roles

Unscoped Roles

API Role Name	UI Role Name	Granted Access
`owner`	Global Organization Owner	Perform all actions: Add, edit, or delete any resource, security settings, or user accounts.
`admin`	Global Administrator	Perform all actions except cannot change security settings and cannot perform user management tasks.
`read_only`	Global read-only	View any resource or security settings. Cannot perform any operations.
`global_object_provisioner`	Global Policy Object Provisioner	Provision rules containing IP lists, services, and label groups, and manage security settings. Cannot provision rulesets, virtual services, or virtual servers, or add, modify, or delete policy items.

Scoped Roles

API Role Name	UI Role Name	Granted Access
`ruleset_manager`	Full Ruleset Manager	Add, edit, and delete all rulesets within a specified scope. Add, edit, and delete rules when the provider matches a specified scope. The rule consumer can match any scope.
`limited_ruleset_manager`	Limited Ruleset Manager	Add, edit, and delete all rulesets within a specified scope. Add, edit, and delete rules when the provider and consumer match the specified scope. Ruleset managers with limited privileges cannot manage rules that use IP lists, user groups, label groups, iptables rules as consumers, or rules that allow internet connectivity.
`ruleset_provisioner`	Ruleset Provisioner	Provision rulesets within a specified scope. Cannot provision virtual servers, virtual services, SecureConnect gateways, security settings, IP lists, services, or label groups.

Ruleset Manager and Ruleset Provisioner

Suppose you are granting a user or group the Ruleset Manager or the Ruleset Provisioner role. In that case, you can also associate a scope to the role so you can control which rulesets they can add and provision.

There is a default read-only user permission that is organization-wide and inherited by all users in the organization. This global permission allows users with no permissions explicitly granted to them to access the PCE.

NOTE

For information, see Organization-Wide Default User Permission [168].

Role HREF Syntax

An RBAC role is identified in the REST API by its HREF, the exact syntax of which is based on the PCE organization HREF `[org_href]`.

```
[org_href]/roles/[role_name]
```

For example, if you wanted to grant a user permission with the Global Object Provisioner role, and your PCE organization HREF is `/org/6`, the role HREF would look like:

```
/orgs/6/roles/global_object_provisioner
```

Parameters for RBAC Permissions

Parameter	Description	Type	Required
`org_id`	Organization	Integer	Yes
`auth_security_principal`	The authorization security principal associated with the permission. It is not needed to get an individual permission or to delete a permission. The HREF of the authorization security principal (`auth_security_principal`) associated with the user or group being granted a permission. The HREF of an authorization security principal is returned when you create a new one, or you can GET a collection of authorization security principals in your PCE.	String	POST:Yes PUT:No
`role`	The RBAC role associated with the permissions. An RBAC role is identified in the REST API by its HREF, the exact syntax of which is different for every user and is based on the PCE organization HREF `[org_href]`. For example: `[org_href]/roles/[role_name]` For example, to grant a user permission with the Global Object Provisioner role, with a PCE organization HREF of `/org/6`, the role HREF would be: `/orgs/6/roles/global_object_provisioner` (For additional information about these roles and their associated capabilities, see the *PCE Administration Guide*.) Unscoped roles: • `owner` • `admin` • `read_only` • `global_object_provisioner` Scoped roles: • `ruleset_manager` • `limited_ruleset_manager` • `ruleset_provisioner`	String	Yes
`scope`	Scope to filter on, where the scope is in the format defined in `org_scope.schema.json`	String	No
`permission_id`	UUID of the permission	String	Yes

RBAC Properties

Parameter	Description	Type	Required
`org_id`	Organization	Integer	Yes
`permission_id`	UUID of the permission. Used to get, update, and delete an individual permission	String	Yes
`auth_security_principal`	The authorization security principal associated with the permission. It is not needed to get an individual permission or to delete a permission. Reference to `auth_security_principal_uri.schema.json`		
`role`	The RBAC role associated with the permissions. Reference to `common/orgs_roles.schema.json`		Yes
`scope`	Scope to filter on, where the scope is in the format defined in `org_scope.schema.json`		Yes

Get RBAC Permissions

These methods get an individual user permission or a collection of permissions in the organization.

By default, the maximum number of permissions returned on a GET collection is 500. If you want to get more than 500, use an Asynchronous GET Collection.

URI to Get All Permissions in Your Organization

```
GET [api_version][org_href]/permissions
```

URI to Get an Individual Permission

```
GET [api_version][permissions_href]
```

Curl Command Get Permissions with a Specific Role

```
curl -i -X GET https://pce.my-company.com:8443/api/v2/orgs/7/permissions?
role=ruleset_provisioner -H "Accept: application/json" -u $KEY:$TOKEN
```

Grant RBAC Permissions

When RBAC permission is granted to a user in the PCE, the user account (identified by its authorization security principal) is associated with a role. Depending on the role, scopes can be applied that restrict the permission to operating on specified labeled resources.

URI to Create a New Permission

```
POST [api_version][org_href]/permissions
```

Scoped Permissions

The permission for this scoped role consists of the following elements:

- A scope for the role (application, environment, and location labels)
- The role
- An authorization security principal associated with a user account

NOTE

See the scope parameter change in Use the New Schema and Query Parameter [156].

Example Request Body with `orgs_permission.schema.json`

```
{
    "scope": [
    {
    "label_group": {
        "href": "/orgs/1/sec_policy/active/label_groups/7d480df0-f5e1-4d1e-
b088-d8105150a883"
        }
    },
    {
    "label": {
         "href": "/orgs/1/labels/12"
        }
    }
    ],
    "role": {
        "href": "/orgs/1/roles/limited_ruleset_manager"
    },
    "auth_security_principal": {
    "href": "/orgs/1/auth_security_principals/177027ca-c3fe-4610-ac14-
fe5cba173af5"
    }
}
```

Example Response for a Scoped Permission

The response shows the new permission (at the top) that has been created identified by its HREF:

```
{
    "href": "/orgs/2",
        "display_name": "Luke",
            "permissions": [
            {
               "href": "/orgs/2/permissions/23dde367-41ea-4752-
```

```
bfe5-16c173aad1a5",
               "role": {
                   "href": "/orgs/2/roles/limited_ruleset_manager"
                        },
                "scope": [
                    {
               "label": {
                     "href": "/orgs/2/labels/452",
                      "key": "app",
                    "value": "App1"
           }
       }
       {
               label: {
                      "href": "/orgs/2/labels/454",
                       "key": "loc",
                       "value": "Loc1"
           }
       }
       ],
            "auth_security_principal": {
            "href": "/orgs/2/auth_security_principals/04b63b79-9883-4e84-
acc5-f727f1c67fa1"
                     }
    },
        ........
}
```

Unscoped Permissions

Request - Unscoped Permission

In this request for unscoped permission, the required `scope` property is defined as an empty JSON array (`[ ]`).

NOTE

When the `scope` parameter is empty, the change explained in Use the New Schema and Query Parameter does not apply.

```
{
  "scope": [],
  "role": { "href": "/orgs/7/roles/owner" },
  "auth_security_principal":{"href":"/orgs/7/auth_security_principals/
xxxxxxxx-e4bf-4ba5-bd77-ccfc3a8ad999"}
}
```

Response - Unscoped Permission

```
{
  "href": "/orgs/7/permissions/51d9207c-354b-45de-9bf5-d1b613ac3719",
  "role": { "href": "/orgs/7/roles/owner" },
```

```
  "scope": [],
  "auth_security_principal":{"href":"/orgs/7/auth_security_principals/
xxxxxxxx-e4bf-4ba5-bd77-ccfc3a8ad999"}
}
```

Update an RBAC Permission

This method updates permission, for example, changing the permission role, authorization security principal, user, or group.

URI to Update a Permission

```
PUT [api_version][permissions_href]
```

Curl Command to Update the Role Permission

```
curl -i -X PUT https://pce.mycompany.com:8443/api/v2/orgs/7/permissions/
xxxxxxxx-354b-45de-9bf5-d1b613ac3719 -H "Content-Type: application/
json" -u $KEY:$TOKEN -d '{"scope": [{"href": "/orgs/7/labels/
91", "key": "app", "value": "db"},{"href": "/orgs/7/labels/92",
"key": "loc", "value": "nyc"},{"href": "/orgs/7/labels/100",
"key": "env", "value": "prod"}],"role": {"href": "/orgs/7/roles/
global_object_provisioner"}, "auth_security_principal":{"href":"/orgs/7/
auth_security_principals/xxxxxxxx-e4bf-4ba5-bd77-ccfc3a8ad999"}}'
```

Delete an RBAC Permission

Curl Command to Delete a Permission

```
curl -i -X DELETE https://pce.mycompany.com:8443/api/v2/orgs/7/.permissions/
xxxxxxxx-354b-45de-9bf5-d1b613ac3719 -H "Accept: application/json-u
$KEY:$TOKEN
```

Authorization Security Principals

This Public Experimental API gets, creates, updates, and deletes authorization security principals.

An authorization security principal connects a user account with its permissions, which consists of a role and optional scopes.

API Methods

Functionality	HTTP	URI
Get a collection of authorization security principals in an organization.	`GET`	`[api_version][org_href]/auth_security_principals`
Get an individual authorization security principal	`GET`	`[api_version][auth_security_principal_href]`
Create an individual authorization security principal.	`POST`	`[api_version][org_href]/auth_security_principals`
Update an authorization security principal.	`PUT`	`[api_version][auth_security_principal_href]`
Delete an authorization security principal.	`DELETE`	`[api_version][auth_security_principal_href]`

Auth Principals Parameters

Parameters used for Auth Security Principals are:

Parameter	Description	Type	Required
`org_id`	Organization Id	Integer	Yes
`name`	Name of the authorization security principal. • If the user is local (managed by the PCE), the `name`must be an e-mail address of the local user. • If the user or group are managed by an external IdP, use the name that identifies the external user or group in the external system.	String	GET, PUT: No POST: Yes
`type`	One of two types of users, either `user` or `group`.	String	GET, PUT: No POST: Yes
`auth_security_principal_id`	UUID of the auth_security_principal. Required for `[api_version][auth_security_principal_href]`	String	Yes
`display_name`	An optional display name for the authorization security principal.	String	No
`access_restriction`	Access restriction assigned to this user	String NULL	No

Auth Principals Properties

Property	Description	Type	Required
`href`	URI of auth_security_principal	String	Yes
`name`	Name of the authorization security principal. • If the user is local (managed by the PCE), the `name`must be an e-mail address of the local user. • If the user or group are managed by an external IdP, use the name that identifies the external user or group in the external system.	String	GET, PUT: No POST: Yes
`type`	One of two types of users, either `user` or `group`.	String	GET, PUT: No POST: Yes
`auth_security_principal_id`	UUID of the auth_security_principal. Required for `[api_version][auth_security_principal_href]`	String	Yes
`display_name`	An optional display name for the authorization security principal.	String	No
`access_restriction`	Access restriction assigned to this user	String NULL	No

Get Authorization Security Principals

This method gets an individual or a collection of authorization security principals in your organization.

By default, the maximum number returned from a GET collection of authorization security principals is 500. If you want to get more than 500, use an Asynchronous GET Collection.

URI to Get a Collection of Authorization Security Principals

```
GET [api_version][org_href]/auth_security_principals
```

URI to Get an Individual Authorization Security Principal

Use the `auth_security_principal_id` in a GET collection response (the last set of numbers in an HREF field).

```
GET [api_version][org_href]/auth_security_principals/
{auth_security_principal_id}
```

Curl Command to Get Authorization Security Principals

```
curl -i -X GET https://pce.my-company.com:8443/api/v2/orgs/2/
auth_security_principals -H "Accept: application/json" -u $KEY:$TOKEN
```

Response

Each individual authorization security principal returned is identified by its HREF. You can use the HREF to GET, PUT, or DELETE an authorization security principal.

```
 {
      "href": "/orgs/7/auth_security_principals/
97cb9898-027b-474e-9807-19e04460dfb0",
      "name": "jimmyjo@illum.io",
      "display_name": "Jimmy Joe Meeker",
      "type": "user"
   },
..............................
   {
      "href": "/orgs/7/auth_security_principals/db7a2657-dcb8-4237-
a6e7-7269cdbaea5d",
      "name": "foxy.brown@illumio.com",
      "display_name": "Foxy Brown",
      "type": "user"
   }
]
```

Curl Command to Get an Authorization Security Principal

```
curl -i -X GET -H "Accept: application/
json -u $KEY:'TOKEN' https://pce.my-company.com:8443/api/v2/orgs/2/
auth_security_principals/db7a2657-dcb8-4237-a6e7-7269cdbaea5d
```

Create an Authorization Security Principal

This method creates an individual authorization security principal.

URI to Create an Authorization Security Principal

```
POST [api_version][org_href]/auth_security_principals
```

Request Body - Local User Authorization Security Principal

```
{
   "type": "user",
   "name": "joe_user@illumio.com",
   "display_name": "Joe User"
}
```

Response Body - Local User Authorization Security Principal

```
{
   "href": "/orgs/7/auth_security_principals/e8c232d2-e4bf-4ba5-bd77-
ccfc3a8ad999",
   "name": "joe_user@illumio.com",
   "display_name": "Joe User",
   "type": "user"
}
```

Request Body - External Group User Authorization Security Principal

```
{
   "type": "group",
   "name": "jCQN=Bank-Admin,OU=EU,DC=Acme,DC=com",
   "display_name": "Provisioners for Bank Accounts"
}
```

Response Body - External Group Authorization Security Principal

```
{
   "href": "/orgs/7/auth_security_principals/e8c232d2-e4bf-4ba5-bd77-
ccfc3a8ad777",
   "name": "jCQN=Bank-Admin,OU=EU,DC=Acme,DC=com",
   "display_name": "Acme Bank Admins",
   "type": "group"
}
```

Curl Command Create an Authorization Security Principal

```
curl -i -X POST https://pce.my-company.com:8443/api/v2/orgs/2/
auth_security_principals -u $KEY:$TOKEN -H "Content-Type:application/json"
-d '{"type": "user","name":"joe_user@illumio.com", "display_name": "Joe
User"}'
```

Update an Authorization Security Principal

In order to update an individual authorization security principal, use its HREF, which is obtained from the response from a GET collection.

URI to Update an Individual Authorization Security Principal

```
PUT [api_version][auth_security_principal_href]
```

Request Body

```
{
   "type": "user",
   "name": "joe_user2@illumio.com",
   "display_name": "Joe User"
}
```

Curl Command Create an Authorization Security Principle

```
curl -i -X PUT https://pce.my-company.com:8443/api/v2/orgs/2/sec_policy/
draft/services/79 -H "Content-Type:application/json" -u $KEY:$TOKEN -d
'{"type": "user", "name": "joe_user2@illumio.com", "display_name": "Joe
User"}'
```

Delete an Authorization Security Principal

To delete an authorization security principal, use its HREF, which is returned in the response from a GET collection.

URI to Delete an Individual Authorization Security Principal

```
DELETE [api_version][auth_security_pincipal_href]
```

Curl Command Delete the Authorization Security Principal

```
curl -i -X DELETE -H "Accept: application/
json" -u $KEY:$TOKEN https://pce.my-company.com:8443/api/v2/orgs/2/
auth_security_principals/e8c232d2-e4bf-4ba5-bd77-ccfc3a8ad777
```

Organization-wide Default User Permissions

This Public Experimental API supplies an organization-wide default user permission and allows users to log into the PCE and view resources. These resources must not be explicitly assigned to any RBAC roles or scopes.

About Default User Permissions

If you use an external identity provider for user management, you might want to block some of those users from the PCE without removing them from your identity provider. *Deleting* the organization-wide read-only permission allows you to achieve this.

When the read-only user permission is disabled for your organization, users not explicitly assigned this permission cannot log into the PCE and access Illumio resources. If users, without permission, attempt to log into the PCE, their external identity provider authenticates them, but the PCE immediately logs them out.

To disable organization-wide read-only permissions:

1. Get a collection of all authorization security principals in your organization, and search the response for the one named `null`. Once you find this authorization security principal, please note its full HREF.
2. Get the HREF of the permissions object associated with the `null`authorization security principal. Keep a record of the JSON object for this permission if you want to re-enable the permission at a later date.
3. Delete the permission associated with the `null` authorization security principal.

Get a Collection of Authorization Security Principals

The first step in disabling the organization-wide read-only permission is to get a collection of all authorization security principals in your organization.

Curl Command Get Auth Security Principals Collection

```
curl -i -X GET https://pce.mycompany.com:8443/api/v2/orgs/7/
auth_security_principals -H "Accept: application/json" -u $KEY:$TOKEN
```

Example Response Body

The `null` authorization security principal in the following example is highlighted in blue:

```
[
.................................................
  {
      "href": "/orgs/7/auth_security_principals/a23ea011-4191-49e6-a22a-
d3dba4fb8058",
      "name": null,
      "display_name": null,
      "type": "group"
   },
.................................................
]
```

Get Permission for Null Auth Security Principal

To get the permission object associated with the `null` authorization security principal, call the GET Permissions API with the query parameter value set to the HREF for the `null` authorization security principal, similar to the curl command:

```
curl -i -X GET -H "Accept: application/
json" -u $KEY:$TOKEN https://pce.mycompany.com:8443/api/v2/
orgs/7/permissions?auth_security_principal=/orgs/7/auth_security_principals/
a23ea011-4191-49e6-a22a-d3dba4fb8058
```

Response

The response returns the HREF of the permission associated with the organization-wide read-only permission.

```
{
      "href": "/orgs/7/permissions/14c92849-e88e-4930-8804-3245565619e5",
      "role": {
      "href": "/orgs/7/roles/read_only"
   },
      "scope": [],
      "auth_security_principal": {
      "href": "/orgs/7/auth_security_principals/a23ea011-4191-49e6-a22a-
d3dba4fb8058"
}
```

Delete Null Authorization Security Principal Permission

Keep a record of the permission object returned in case you want to re-enable the permission in the future.

Delete the read-only permission HREF to disable it.

Curl Command to Delete Null Authorization Security Principal Permission

```
curl -i -X DELETE -H "Accept: application/
json" -u $KEY:$TOKEN https://pce.mycompany.com:8443/api/v2/orgs/7/
permissions?auth_security_principal=/orgs/7/auth_security_principals//
orgs/7/permissions/14c92849-e88e-4930-8804-3245565619e5
```

Response

An HTTP 200 response is returned on successfully deleting the organization-wide read-only permission.

Re-Enable Organization Read-Only Permission

If the organization-wide read-only permission was disabled, you can re-enable it by recreating the permission object. This object must be constructed precisely as the object returned to you when you got the permission. The request body below illustrates the JSON structure of this permission object.

URI to Enable the Organization-Wide Read-Only Permission

```
POST [api_version][permission_href]
```

Request Body

```
{
    "role": {
        "href": "/orgs/7/roles/read_only"
    },
    "auth_security_principal": {
        "href": "/orgs/7/auth_security_principals/a23ea011-4191-49e6-a22a-
d3dba4fb8058"
    },
    "scope": []
}
```

Curl Command to Enable Organization Read-Only Permission

```
curl -i -X POST https://pce.mycompany.com:8443/api/v2/orgs/7/permissions
-H "Content-Type: application/json" -u $KEY:$TOKEN -d '{"role":
{"href": "/orgs/7/roles/read_only"}, "auth_security_principal":{"href":"/
orgs/auth_security_principals/a23ea011-4191-49e6-a22a-d3dba4fb8058"},
"scope": []}'
```

Response

An HTTP 201 response is returned on successfully recreating the organization-wide read-only permission.

App Owner RBAC Role

The App Owner RBAC (Role-Based Access Control) role hides information in the PCE that is not relevant to the user with that role. At the same time, the app owners can write effective rules to secure their apps and restrict visibility within the PCE to the permitted scopes for users.

RBAC previously restricted only the write permission for users while the read permission was unrestricted, and every user had visibility into PCE. The App Owner RBAC role also restricts the read permission to correspond to the user roles. It accelerates enterprise-wide expansion so that the customers who acquired Illumio for a single application can expand faster.

The introduction of the App Owner role solves these problems because it does the following:

- Accelerates micro-segmentation deployment by allowing for scaling after an organization implements micro-segmentation with smaller applications.
- Assures compliance with good security practices so that users cannot view the sensitive information they are not allowed to see.
- Eliminates the complexity of building a custom portal. The App Owners can use Illumio REST APIs instead of the custom UIs created by customers.

App Owners are responsible for managing vulnerabilities in their applications for which the PCE owners can assign scoped roles.

App Owner Roles

Roles of Ruleset Managers, Ruleset Provisioners, and Workload Managers are assigned to users and user groups. They can be expanded to provide users with additional read/write permissions. All permissions are additive.

Ruleset Manager with Scoped Reads

This RBAC role requires written permission from the owner to change the policy. Users with this role can see only the content related to their location in the PCE instead of having full read-only access to all the PCE content.

The role now also supports scoped reads.

Ruleset Provisioner with Scoped Reads

This RBAC role can provision policy changes to workloads. Users with this role can see only the content related to their location in the PCE instead of having full read-only access to all the PCE content.

The role now also supports scoped reads.

Ruleset Viewer

This RBAC role has access to the PCE to manage one or multiple applications. Users with this role can get a view of their application and its dependencies, but they cannot see information about other applications.

Workload Manager with Scoped Reads

This RBAC role provides a control for managing workloads. Users with this role can see only the content related to their scope in the PCE instead of having full read-only access to all the PCE content.

The role now also supports scoped reads.

Security Policy Objects

The security policy in Illumio represents a configurable set of rules that protects network assets from threats and disruptions and secures communications between workloads.

The PCE contains security objects, such as IP lists, labels, label groups, and services to help you write your security policy. These objects define version, modifications, dependencies, changes, and whether a policy can be reverted.

In Illumio's label-based system, the rules you write don't require the use of an IP address or subnet, and you can control the range of your policy by using labels. Use label groups to write rules more efficiently if the same labels are used repeatedly in rulesets.

Security Policy Objects

Security policy objects contain information about policy versions, modifications, whether they are still pending and can be reverted, policy dependencies, and policy changes.

Active vs. Draft

This Public Stable API operates on provisionable objects in either a `draft` (not provisioned) state or an `active` (provisioned) state.

Provisionable items include label groups, services, rulesets, IP lists, virtual services, firewall settings, SecureConnect gateways, and virtual servers. For these objects, the URL of the API call must include the element called `:pversion`, which can be set to either `draft` or `active`.

Depending on the method, the API follows these rules:

- For GET operations — `:pversion` can be `draft`, `active`, or the ID of the security policy.
- For POST, PUT, DELETE — `:pversion` can be `draft` (you cannot operate on active items) or the ID if the security policy.

Security Principals

Security principals are typically unique identifiers for Windows Advanced Directory groups but can also be unique identifiers for individuals. This Public Stable API allows you to get (one or many), create (one or bulk), update, and delete security principals.

An array of security principals HREFs can be passed into rules and rulesets in the `consuming_security_principals` array.

NOTE

The common schema `consuming_security_principals` has been replaced by two other APIs: `consuming_security_principals_get` and `consuming_security_principals_put`

Security Principals API Methods

Security Principals Methods	HTTP	URI
Get Security Principals	`GET`	`[api_version][org_href]/security_principals/`
Get a Security Principal	`GET`	`[api_version][org_href]/security_principals/sid`
Create a Security Principal	`POST`	`[api_version][org_href]/security_principals/`
Bulk create Security Principals	`PUT`	`[api_version][org_href]/security_principals/bulk_create`
Update a Security Principal	`PUT`	`[api_version][org_href]/security_principals/sid`
Delete a Security Principal	`DELETE`	`[api_version][org_href]/security_principals/sid`

Query Parameters

The only required parameter for all API methods is `org_id`.

Parameter	Description	Type	Required
`org_id`	Organization ID	Integer	Yes
`max_results`	Maximum number of entries to return	Integer	No
`name`	Name of security principal to filter by	String	GET, PUT: No POST: Yes
`sid`	SID of security principal to filter by	String	GET: No POST, PUT, DELETE: Yes

Response Properties

Parameter	Description	Type
`href`	URI of security principal	String
`sid`	Active Directory SID	String
`name`	Name of security principal	String
`used_by_ruleset`	Flag to indicate if this security principal is being used by a ruleset	Boolean
`deleted`	Flag to indicate if the security principal has been deleted.	Boolean

Get Security Principals

This GET command, by default, returns information for 100 security principals if `max_results` is not specified.

A maximum value of up to 500 can be specified for `max_results`. To return more than 500 security principals, see Asynchronous GET Collections.

Curl Command to Get Security Principals

```
curl -X GET https://pce.my-company.com:8443/api/v2/security_principals -u
$KEY:$TOKEN -H 'Accept: application/json'
```

Example JSON Response Body

```
{
 "sid": "string",
 "name": "string",
 "description": "string"
}
```

Get a specified Security Principal

This GET command returns information about one specific security principal indicated by its `sid`.

Curl Command to Get a Security Principal

```
curl -X GET https://pce.my-company.com:8443/api/v2/security_principals/
{sid} -u $KEY:$TOKEN -H 'Accept: application/json'
```

Example JSON Response Body

```
{
  "sid": "string",
  "name": "string",
  "description": "string"
}
```

Create a Security Principal

This POST command, on success, returns the HREF of the created security principal.

Curl Command to Create a Security Principal

```
curl -X POST https://pce.my-company.com:8443/api/v2/security_principals -u
$KEY:$TOKEN -H 'Content-Type: application/json'
```

Example JSON Request Body

```
{
  "sid": "string",
  "name": "string",
  "description": "string"
}
```

Bulk Create Security Principals

This PUT command creates multiple security principals.

A maximum of 2,000 security principals can be added to this API in a call. On success, this API returns an array containing the HREFs of the created security principals.

Curl Command to Bulk Create Security Principals

```
curl -X PUT https://pce.my-company.com:8443/api/v2/security_principals/
bulk_create -u $KEY:$TOKEN -H 'Content-Type: application/json'
```

Example JSON Request Body

```
[
  {
    "sid": "string",
    "name": "string",
    "description": "string"
  },
  {
    "sid": "string_2",
    "name": "string_2",
    "description": "string_2"
  }
]
```

Update a Security Principal

This PUT command updates a security principal.

Curl Command to Update a Security Principal

```
curl -X PUT https://pce.my-company.com:8443/api/v2/security_principals/
{sid} -u $KEY:$TOKEN -H 'Content-Type: application/json'
```

Example JSON Request Body

```
{
  "name": "string",
  "description": "string"
}
```

Delete a Security Principal

This command deletes a security principal.

Curl Command to Delete a Security Principal

```
curl -X DELETE https://pce.my-company.com:8443/api/v2/security_principals/
{sid} -u $KEY:$TOKEN
```

This command returns `204 No Content` for success.

Labels

This Public Stable API gets, creates, updates, and deletes labels.

Labels API Methods

Functionality	HTTP	URI
Get a collection of labels.	`GET`	`[api_version][org_href]/labels`
Get an individual labe.l	`GET`	`[api_version][label_href]`
Create a label	`POST`	`[api_version][org_href]/labels`
Update a label	`PUT`	`[api_version][label_href]`
Delete a label	`DELETE`	`[api_version][label_href]`

Get Labels

This API returns all labels in an organization or a single label. When you get labels, they are returned in the form of an HREF path property, for example: `"/orgs/2/labels/1662"`

By default, the maximum number returned on a GET collection of labels is 500. To return more than 500 labels, use an Asynchronous GET Collection.

NOTE

GET returns any label that contains a match instead of an exact match. For example, a GET request for labels with value=APP could return APP, WEB-APP, WEBAPP.

URI to Get Collection of Labels

```
GET [api_version][org_href]/labels
```

URI to Get an Individual Label

```
GET [api_version][label_href]
```

Query Parameters

Parameter	Description	Type	Required
`org_id`	Organization ID	Integer	Yes
`external_data_reference`	A unique identifier within the external data source	String	No
`external_data_set`	The data source from which a resource originates	String	No
`include_deleted`	Include deleted labels	Boolean	No
`key`	Key by which to filter	String	GET: No POST: Yes
`max_results`	Maximum number of labels to return.	Integer	No
`usage`	Indicate label usage, including if the label is currently used in an RBAC scope for user permissions, if the label is applied to a workload, virtual service, Pairing Profile, selective enforcement, virtual server, or ruleset, and if the label belongs to a label group.	Boolean	No
`value`	Value on which to filter. Supports partial matches.	String	GET, PUT: No POST: Yes
`label_id`	Label ID, for `[api_version][label_href]`	Integer	Yes

Response Properties

Property	Description	Type
`key`	Key in key-value pair	String
`value`	Value in key-value pair",	String
`href`	Label URI	
`updated_at`	Timestamp when this label was last updated	String
`created_at`	Timestamp when this label was first created	String
`external_data_reference`	A unique identifier within the external data source	String, Null
`external_data_set`	The data source from which a resource originates	String, Null

Curl Command to Get Collection of Labels

```
curl -i -X GET https://pce.my-company.com:8443/api/v2/orgs/2/labels -H
"Accept: application/json" -u $KEY:$TOKEN
```

Response Body

In the response body, each label returned is identified as an HREF, for example: `"/orgs/2/labels/1662"`

For example:

```
 {
          href: "/orgs/2/labels/1662"
          key: "env"
          value: "Prod"
          created_at: "2020-01-22T18:24:33Z"
          updated_at: "2020-01-22T18:24:40Z"
          created_by: {
             href: "/users/9"
          }
          updated_by: {
             href: "/users/9"
          }
     }
     {
          href: "/orgs/2/labels/1128"
          key: "role"
          value: "DB"
          created_at: "2020-01-22T18:24:53Z"
          updated_at: "2020-01-22T18:24:59Z"
          created_by: {
              href: "/users/9"
         }
          updated_by: {
              href: "/users/9"
         }
     }
```

Curl Command to Get a Label

```
curl -i -X GET https://pce.my-company.com:8443/api/v2/orgs/2/labels/8 -H
"Accept: application/json" -u $KEY:$TOKEN
```

Response Body

```
{
     href: "/orgs/2/labels/8"
     key: "env"
     value: "Prod"
     created_at: "2020-01-22T18:24:33Z"
     updated_at: "2020-01-22T18:24:40Z"
     created_by: {
          href: "/users/9"
     }
     updated_by: {
          href: "/users/9"
     }
}
```

Create a Label

This API creates a new label inside an organization for one of the following label types, for which you can provide your own string value:

- **Application** (“app”): The type of application the workload is supporting. For example, HRM, SAP, Finance, Storefront.
- **Role** (“role”): The function of a workload. In a simple two-tier application consisting of a web server and a database server, there are two roles: Web and Database.
- **Environment** (“env”): The stage in the development of the application. For example, production, QA, development, staging.
- **Location** (“loc”): The location of the workload. For example, Germany, US, Europe, Asia; or Rack #3, Rack #4, Rack #5; or data center, AWS-east1, AWS-east2, and so on.

System Default “All” for Labels

The PCE provides built-in environment, application, and location labels that are defined as "All" that create broad policies to cover all applications, all environments, and all locations.

For this reason, you cannot create labels of these types defined as "All Applications," "All Environments," or "All Locations" (exactly as written in quotes) in order to prevent confusion for policy writers.

If you attempt to create labels of these types with the exact name as the system defaults (for example, "All Applications"), you receive an HTTP "406 Not Acceptable" error.

Illumio recommends not creating labels with names similar to these default system labels to avoid confusion.

URI to Create a Label

```
POST [api_version][org_href]/labels
```

Example Request Body

```
{
   "key":"role",
   "value":"web"
}
```

Curl Command to Create a Label

```
curl -i -X POST https://pce.my-company.com:8443/api/v2/orgs/2/
labels -H "Content-Type: application/json" -u $KEY:$TOKEN -d
'{"key":"role","value":"web"}'
```

Response Body

The created label is in the form of an HREF path property. For example, in the response below, the label is identified as `"/orgs/2/labels/1677"`.

```
{
     href: "/orgs/2/labels/1677"
     key: "role"
     value: "my_web_app"
     created_at: "2014-04-18T19:39:27Z"
     updated_at: "2014-04-18T19:39:27Z"
     created_by: {
         href: "/users/76"
     }
     updated_by: {
         href: "/users/76"
     }
}
```

Update a Label

This API allows you to update a label applied to a workload, given that you have the label HREF, which is returned when you get all labels in an organization. For example: `"/orgs/2/labels/1662"`

URI to Update a Label

```
PUT [api_version][label_href]
```

Example Request Body

To update a label definition, the JSON request body can be constructed as follows:

```
{ "value":"db" }
```

Curl Command to Update a Label

```
curl -X PUT https://pce.my-company.com:8443/api/v2/orgs/2/labels/1662 -H
"Accept: application/json" -u $KEY:$TOKEN -d '{"value":"db"}
```

Delete a Label

This API deletes a label from an organization using the label HREF, which is returned when you get a collection of labels in an organization. For example: `"/orgs/2/labels/1662"`

URI to Delete a Label

```
DELETE [api_version][label_href]
```

Curl Command to Delete a Label

```
curl -i -X DELETE https://pce.my-company.com:8443/api/v2/orgs/2/labels/1662
-H "Accept: application/json" -u $KEY:$TOKEN
```

Label Groups

This Public Stable API helps you write rules more efficiently if the same labels are used repeatedly in rulesets. When you add labels to a label group, the label group can be used in a rule or ruleset scope to represent multiple labels. A label group can also be a member (child) of other label groups.

Label Groups API Methods

Functionality	HTTP	URI
Get a collection of label groups.	`GET`	`[api_version][org_href]/sec_policy/draft/label_groups`
Get an individual label group.	`GET`	`[api_version][label_group_href]`
Get an individual label group to see if it is a member of other label groups.	`GET`	`[api_version][label_group_href]/member_of`
Create a new label group.	`POST`	`[api_version][org_href]/sec_policy/draft/label_groups`
Update an individual label group.	`PUT`	`[api_version][label_group_href]`
Delete an individual label group.	`DELETE`	`[api_version][label_group_href]`

Active vs. Draft

This API operates on provisionable objects, which exist in either a `draft` (not provisioned) state or an `active` (provisioned) state.

Provisionable items include label groups, services, rulesets, IP lists, virtual services, firewall settings, enforcement boundaries, and virtual servers. For these objects, the URL of the API call must include the element called `:pversion`, which can be set to either `draft` or `active`.

Depending on the method, the API follows these rules:

- For GET operations — `:pversion` can be draft, active, or the ID of the security policy.
- For POST, PUT, DELETE — `:pversion` can be draft (you cannot operate on active items) or the ID if the security policy.

Get a Collection of Label Groups

This method gets all label groups in your organization. Use this to discover the `label_group_id` to GET a specific label group or for POST, PUT, and DELETE operations.

By default, the maximum number returned on a GET collection of label groups is 500. If you want to get more than 500 label groups, use an Asynchronous GET Collection.

URI to Get a Collection of Label Groups

```
GET [org_href]/sec_policy/draft/label_groups
```

URI to Get an Individual Label

```
GET [label_group_href]
```

Query Parameters

Parameter	Description	Type	Required
`org_id`	Organization	Integer	Yes
`pversion`	Security Policy Version	String	Yes
`label_group_id`	Label Group UUID, for `[api_version][label_group_href]` and `[api_version][label_group_href]/member_of`	String	Yes
`usage`	Include label usage flags.	Boolean	No

Response Properties

Property	Description	Type
`href`	URI of this label group	String
`name`	The specific name of a label group to return. Supports partial matches	String
`key`	Key by which to filter	String
`created_at`	Timestamp when this label group was first created	String date/time
`updated_at`	Timestamp when this label group was last updated	String date/time
`deleted_at`	Timestamp when this label group was deleted	String, null
`created_by`	User who originally created this label group "$ref": "../common/href_object.schema.json"	
`updated_by`	User who last updated this label group "$ref": "../common/href_object.schema.json"	
`deleted_by`	User who deleted this label group "$ref": "../common/href_object.schema.json"	Null
`blocked_connection_reject_scopes`	Label Group is referenced by Blocked Connection Reject Scopes. Replaces the property `blocked_connection_reject_scope`	Boolean
`loopback_interfaces_in_policy_scopes`	Label Group is referenced by Loopback Interfaces in Policy Scopes	Boolean
`ip_forwarding_enabled_scopes`	Label Group is referenced by IP Forwarding Enabled Scopes	Boolean

Curl Command to Get Label Groups

```
curl -i -X GET https://pce.my-company.com:8443/api/v2/orgs/3/sec_policy/
draft/label_groups -H "Accept: application/json" -u $KEY:$TOKEN
```

Response

When you get a collection of label groups, each label group is identified by an HREF. You need the HREF to update or delete an individual label group using the API.

```
{
    "href": "/orgs/2/sec_policy/draft/label_groups/4c8e3325-c6dd-4dc2-
aadc-971e9de270e4",
```

```
    "created_at": "2020-07-25T00:46:52.552Z",
    "updated_at": "2020-07-25T00:59:00.177Z",
    "deleted_at": null,
    "created_by": {
      "href": "/users/3"
    },
    "updated_by": {
      "href": "/users/3"
    },
    "deleted_by": null,
    "name": "AppGroup1",
    "description": null,
    "key": "app",
    "labels": [],
    "sub_groups": [
      {
        "href": "/orgs/2/sec_policy/draft/label_groups/9b30081e-
e105-44d8-9945-4c8a30dbe849",
        "name": "AppGroup3"
      }
    ]
  },
```

Label Group Belonging to Other Groups

This method determines if an individual label group is a member of other label groups. For example, if one label group is also a "child" of three other label groups, the response to this call returns the three "parent" label groups to which the specified label group belongs.

URI to Check if a Label Group Belongs to Other Label Groups

```
GET [api_version][label_group_href]/member_of
```

Response

If the specified label group does not belong to any other label groups, the call returns an HTTP 200 message. If the specified label group does belong to other label groups, the response lists the parent label groups. For example:

```
[
    {
        "href": "/orgs/7/sec_policy/draft/label_groups/b51c986b-db35-47d4-
ab77-aae570d1f164",
        "name": "MyLablesUS"
    }
]
```

Update a Label Group

To update an individual label group, use the HREF of the label group, which is obtained from an API call to get a collection of label groups.

URI to Update a Label Group

```
PUT [label_group_href]
```

Request Body

This example request body updates the labels contained within a label group.

```
{
  "labels": [
    { "href": "/orgs/28/labels/1100" },
    { "href": "/orgs/28/labels/1098" },
    { "href": "/orgs/28/labels/1099" },
    { "href": "/orgs/28/labels/1101" }
  ],
  "sub_groups": []
}
```

Curl Command to Update Label Groups

In this example, the label group being updated with the request body from the code example above is identified by its label group HREF.

```
curl -i -X PUT https://pce.my-company.com:8443/api/v2/orgs/2/
sec_policy/draft/label_groups/3307b3d8-2ca2-48f5-877a-03ada95cd6de -H
"Content-Type:application/json" -u $KEY:$TOKEN -d '{"labels":
[{"href":"/orgs/28/labels/1100"},{"href":"/orgs/28/labels/1098"},{"href":"/
orgs/28/labels/1099"},{"href":"/orgs/28/labels/1101"}],"sub_groups":[]}'
```

Delete a label Group

To delete an individual label group, specify the HREF of the label group you want to delete, which is obtained from an API call to get a collection of label groups.

URI to Delete a Label Group

```
DELETE [api_version][label_group_href]
```

Curl Command to Delete a Label Group

```
curl -i -X DELETE https://pce.my-company.com:8443/api/v2/orgs/2/sec_policy/
draft/label_groups/3307b3d8-2ca2-48f5-877a-03ada95cd6de -u $KEY:$TOKEN
```

Services

This Public Stable API gets, creates, updates, or deletes services. To write services, they must be in the “draft” state, which means they have not been provisioned. To provision changes made to services, use the Security Policy API.

Services API Methods

Functionality	HTTP	URI
Get a collection of services	GET	[api_version][org_href]/sec_policy/{pversion}/services
Get an individual service	GET	[api_version][org_href]/sec_policy/{pversion}/services/service_id
Create a new service	POST	[api_version][org_href]/sec_policy/draft/services/service_id
Update an individual service	PUT	[api_version][org_href]/sec_policy/draft/services/service_id
Delete an individual service	DELETE	[api_version][org_href]/sec_policy/draft/services/service_id

Active vs. Draft

This API operates on provisionable objects, which exist in either a `draft` (not provisioned) state or an `active` (provisioned) state.

Provisionable items include label groups, services, rulesets, IP lists, virtual services, firewall settings, enforcement boundaries, and virtual servers. For these objects, the URL of the API call must include the element called `:pversion`, which can be set to either `draft` or `active`.

Depending on the method, the API follows these rules:

- For GET operations — `:pversion` can be draft, active, or the ID of the security policy.
- For POST, PUT, DELETE — `:pversion` can be draft (you cannot operate on active items) or the ID if the security policy.

Request Parameters

Parameter	Description	Type	Required
`org_id`	Organization	Integer	Yes
`name`	Name of service on which to filter. This parameter supports partial matches.	String	GET: No POST: Yes
`description`	Description of the service on which to filter. This parameter supports partial matches.	String	No
`pversion`	Security Policy Version	String	Yes
`external_data_set`	The data source from which the resource originates. For example, if service information is stored in an external database.	String	No
`external_data_referenc`	A unique identifier within the external data source. For example, if service information is stored in an external database.	String	No
`is_ransomware`	Services associated with ransomware.	Boolean	No
`max_results`	The maximum number of results to return using GET. The maximum limit for returned services is 500. **NOTE**: If this parameter is not specified, or a value greater than 500 is specified, a maximum of 500 results are returned. To get more than 500 services, use an Asynchronous GET Collection.	Integer	No
`name`	Name of service on which to filter. This parameter supports partial matches.	String	GET: No POST: Yes
`port`	Specify port or port range to filter results. The range is from -1 to 65535 (0 is not supported).	String	No
`proto`	Protocol to filter on	Integer	GET: No PUT, POST: Yes

Properties

Properties	Description	Type
`href`	URI	String
`name`	Name of service.	String
`description`	Description of the service.	String
risk_details	This property contains the object `ransomware`, which is required to define the Ransomware Dashboard. It contains the following properties: • `category`: Categorization based on Admin or Legacy port used in the service • `severity`: Severity of this service • `os_platforms`: Operating system for this ransomware service, an array with "minItems": 1,	Object, NULL
`description_url`	Description URL Read-only to prevent XSS attacks	String
`process_name`	Name of the process.	String
`service_ports`	Reference to `service_ports.schema.json`	
`windows_services`	Reference to `windows_services.schema.json`	
`external_data_set`	External data set identifier.	String NULL
`external_data_referenc`	External data reference identifier	String NULL

sec_policy_post

This schema section shows how the property `risk_details` was added to define the categorization of services based on the ransomware threat:

```
{
    "$schema": "http://json-schema.org/draft-04/schema#",
    "type": "object",
    "additionalProperties": false,
    "required": [
        "name"
        ],
    "properties": {
        "name": {
        "description": "Name (does not need to be unique)",
            "type": "string"
        },
        "description": {
            "description": "Description",
            "type": "string"
```

```
        },
        "risk_details": {
        "type": "object",
        "properties": {
            "ransomware": {
            "type": "object",
            "properties": {
            "category": {
                "description": "Categorization based on Admin or Legacy
port used in the service",
                "type": "string",
                "enum": [
                "admin",
                "legacy"
            ]
        },
        "severity": {
            "description": "Severity of this service",
            "type": "string",
            "enum": [
                "low",
                "medium",
                "high",
                "critical"
            ]
        },
        "os_platforms": {
            "description": "Operating system for this ransomware service",
            "type": "array",
            "minItems": 1,
            "items": {
            "type": "string",
            "enum": [
                "windows",
                "linux"
                ]
            }
            }
          }
         }
```

==========

Get Services

This API gets all the services in your organization that are in the “draft” policy state (not yet provisioned).

By default, the maximum number returned on a GET collection of services is 500. To get more than 500 services, use an Asynchronous GET Collection.

URI to Get a Collection of Services

```
GET [api_version][org_href]/sec_policy/draft/services
```

URI to Get an Individual Service

```
GET [api_version][service_href]
```

Curl Command to Get All Services

```
curl -i -X GET https://pce.my-company.com:8443/api/v2/orgs/2/sec_policy/
draft/services -H "Accept: application/json" -u $KEY:$TOKEN
```

Curl Example to Get a Service

```
curl -i -X GET https://pce.my-company.com:8443/api/v2/orgs/2/sec_policy/
draft/services/91 -H "Accept: application/json" -u $KEY:$TOKEN
```

Response

Each individual service returned is identified by a service HREF. To GET, PUT, or DELETE an individual service, identify the service using its HREF in the API call.


```
{
    "href": "/orgs/7/sec_policy/active/services/878",
    "created_at": "2017-02-10T18:10:50.324Z",
    "updated_at": "2017-02-10T18:10:50.324Z",
    "deleted_at": null,
    "updated_by": null,
    "deleted_by": null,
    "name": "ICMP ECHO",
    "description": null,
    "description_url": null,
    "process_name": null,
    "service_ports": [
      {
        "icmp_type": 8,
        "icmp_code": null,
        "proto": 1
      },
      {
        "icmp_type": 128,
        "icmp_code": null,
        "proto": 58
      }
    ]
  }
```


Create a Service

This method creates an individual service. Once a service is created, it can be used to write rules for a security policy.

URI to Create a Service

```
POST [api_version][org_href]/sec_policy/draft/services
```

Example Payload

```
{
  "name": "RDP",
  "description": "Windows Remote Desktop",
  "service_ports": [
    {
      "port": 3389,
      "proto": 6
    }
  ]
}
```

Curl Command to Create Windows Service

This example shows creating a Windows Remote Desktop (RDP) service.

```
curl -i -X POST https://pce.my-company.com:8443/api/v2/orgs/2/sec_policy/
active/services -H "Content-Type:application/json" -u $KEY:$TOKEN -d
'{"name":"RDP", "description":"Windows Remote Desktop","service_ports":
[{"port":3389,"proto":6}]}'
```

Update a Service

In order to update (PUT) an individual service, you need to know the HREF of the service you want to update. A service's HREF is returned when you get a collection of services from the PCE.

URI to Update an Individual Service

```
PUT [api_version][service_href]
```

Request Body

This example illustrates the request body you can pass to update a service, for example, to change the port used by the Nginx service from its current port number to 8080:

```
{
   "name": "nginx",
   "service_ports": [
     {
       "port": 8080,
       "proto": 6
     }
   ]
 }
```

Curl Command to Update Service

```
curl -i -X PUT https://pce.my-company.com:8443/api/v2/orgs/2/sec_policy/
active/services/79 -H "Content-Type:application/json" -u $KEY:$TOKEN -d
'{"name":"nginx","service_ports":[{"port":8080,"proto":6}]}'
```

Delete a Service

To delete an individual service, use the HREF of the service you want to delete, which is returned when you get a collection of services.

URI to Delete an Individual Service

```
DELETE [api_version][service_href]
```

Curl Command to Delete Service

```
curl -i -X DELETE https://pce.my-company.com:8443/api/v2/orgs/2/sec_policy/
active/services/79 -u $KEY:$TOKEN
```

Core Services Detection

This Public Experimental API helps you identify core services and suggests an appropriate label for them. There are 51 services that can be detected.

Core services (such as DNS, Domain Controller, NTP, and LDP) are essential to your computing environment and run on one or on multiple workloads. Identifying and labeling these workloads is important because they are centrally connected, and other applications depend on them.

When you use core service detection to label and write policies for core services, you can save time on application policies and introduce enforcement faster.

Users can change port numbers on which a specific core service is running so that they can adjust them to their environment. Users cannot change ports using the UI, only the APIs.

The user authorized to manage core services is the Organization Administrator.

Common schemas for managing core services:

- `core_services_labels.schema.json`
- `core_services_type_ports_def.schema.json`
- `core_services_type_ports.schema.json`

Services API Methods

Functionality	HTTP	URI
Get all detected core services for this organization.	GET	[api_version][org_href]/detected_core_services
Get a detected core service by UUID.	GET	[api_version][org_href]/detected_core_services/<uuid>
Get detected core service summary details.	GET	[api_version][org_href]/detected_core_services_summary
Get all core service types for this organization.	GET	[api_version][org_href]/core_service_types
Get core service type by UUID.	GET	[api_version][org_href]/core_service_types/<uuid>
Accept, reject or skip the core service recommendation.	PUT	[api_version][org_href]/detected_core_services/:uuid
Edit suggested labels of a core service type for the organization.	PUT	[api_version][org_href]/core_service_types/:uuid

Query Parameters

Parameter	Description	Type	Required
org_id	Organization ID	Integer	Yes
action	The action taken on the detected core services	String	No
core_service_type	Get all detected core services for a particular core service type.	String	No
max_results	The maximum results to be returned	Integer	No
detected_core_service_id	UUID of the detected core service	String	Yes

Properties

Property	Description	Type
`href`	The href of this detected core service	String
`ip_address`	The ip address that is detected as core service	String
`core_service_type`	Get all detected core services of a particular type, such as Splunk/NFS. The href will be given in the query parameter.	String
`method_name`	The method by which this core service was detected	String
`created_at`	The date at which core service was detected	date/time
`updated_at`	The date core service was updated with action information	date/time
`confidence`	Confidence of the detected core service. "minimum": 50, "maximum": 100"	Integer
`feedback`	Feedback provided for this core service recommendation, if any. "maxLength": 500	String
`action`	Users can accept, skip, or reject the core service determination.	String
`labels_applied`	Indicates if the end user applied labels for this workload	Boolean
`last_detected_at`	Date core service was last recommended by the core service detection algorithm	date/time
`workload`	Reference to `traffic_flows_workload.schema.json`	Object

Parameters for detected_core_services_summary

Parameter	Description	Type	Required
`core_service_type`	The unique identifier for the core service type. A core service type is defined by a name, port information and PCE-recommended labels	String	Yes
`recommended`	Total number of detected core services which are skipped or no decision has been made yet	Integer	No
`accepted`	Number of accepted recommendations	Integer	No
`rejected`	Number of recommendations rejected by the user	Integer	No

Parameters for core_services_types

Parameter	Description	Type	Required
`href`	The href of this core service type	URI	Yes
`name`	The name of the core service type	String	Yes
`labels`	Reference to `core_services_labels.schema.json`		
`created_at`	The timestamp at which this core service type was created	String	Yes
`updated_at`	The timestamp at which this core service type was updated	String	Yes
`required_ports`	Required ports for this core service type, if any Reference to `core_services_type_ports.schema.json`		
`optional_ports`	Optional ports for this core service type, if any "$ref": "core_services_type_ports.schema.json"		
`priority`	Each IP/workload is identified for 1 core service type and is ordered by priority. For PUT: "minimum": 1	Integer	No
`num_optional_ports_required`	Number of optional ports required For PUT: "maximum": 65535	Integer	No
`provider`	Indicates whether the provider is a core service. The default value is `true`, which means the provider is a core service	Boolean	No

Sample URLs and Payloads

`GET /api/v2/orgs/1/detected_core_services/ ddfe5204-ad29-4bcd-9821-fcb62353a985`.

```
{
    "href" :
        "/orgs/1/detected_core_services/ddfe5204-ad29-4bcd-9821-
fcb62353a985" ,
    "ip_address" :
    "103.10.11.44" ,
    "workload" : {
            "hostname" :
        "SE555Q5" ,
        "href" :
        "/orgs/2/workloads/e62d71b3-36c4-4c27-926b-411b93ba6d6f" ,
        "labels" : []
    },
    "core_service_type" : {
            "href" :
             "/orgs/1/core_service_type/3555d1e4-
```

```
fcb2-49c2-9a4a-215c4d5e86dc"
    },
    "confidence" :
        100  ,
    "method_name" :
        "process_based" ,
    "created_at" :
        "2020-08-04T05:02:46.648Z" ,
    "updated_at" :
        "2020-08-04T05:02:46.648Z" ,
    "last_detected_at" :
        "2020-09-05T05:02:46.648Z"
}
```

PUT /api/v2/orgs/1/detected_core_services/3ddd5204-ad29-4bcd-9821-fcb62353a98f

Take the appropriate action for the identified core services, such as accept the recommendation to apply the suggested labels to the workload.

```
Example
    1  :
{ "action" : "accept" }

Example
    2  :
{ "action" : "accept" ,
    "workload" :{ "href" :
    "/orgs/2/workloads/e62d71b3-36c4-4c27-926b-411b93ba6d6f" }} # for the
    case when an IP is converted to UMWL and accepted as core service

Example
    3  :
{ "action" : "reject" }

Example
    4  :
{ "action" : "reject" ,
    "feedback" : "Not a core service." }

Example
    5  :
{ "action" : "skip" ,
    "feedback" : "Check with Ops if this is a core service." }

Example
    6  :
{ "labels_applied" : true }
```

```
GET /api/v2/orgs/ :xorg_id /core_service_types/44dd5204-ad29-4bcd-9821-
fcb62353a98f


{
    "href" : "/orgs/2/core_service_type/44dd5204-ad29-4bcd-9821-
fcb62353a98f" ,
    "core_service" : "splunk" ,
```

```
    "required_ports" :[{ "port" : 9997 ,
        "to_port" : 10000 }],
    "optional_ports" :[{ "port" : 112 }, { "port" : 455 }],
    "labels" : [
    {
        "value" : "app-splunk" ,
        "key" :
            "app"
        "href" : "/orgs/1/labels/2"
    },
    {
        "value" : "role-splunk" ,
        "key" :
            "role" ,
        "href" : "/orgs/1/labels/12"
    } ],
    "created_at" :
        "2020-08-04T05:02:46.648Z" ,
    "updated_at" :
        "2020-08-05T05:02:46.648Z"
}
```

```
PUT /api/v2/orgs/ :xorg_id /core_service_types/44dd5204-
ad29-4bcd-9821-fcb62353a98f
```

```
{
"labels" : [
    {
        "href" : "/orgs/1/labels/3"
    },
    {
        "href" : "/orgs/1/labels/10"
    }]
}
```

Non-corporate Public IP Addresses

The API `sec_policy/rule_coverage` supports non-domain interfaces.

Security Policy Rule Coverage

Security Principals Methods	HTTP	URI
Get Security Principals	`POST`	`[api_version][org_href]/sec_policy/rule_coverage`

Query Parameters

The property `network` accepts `network_href` to correctly determine if the rule applies to a flow.

Parameter	Description
source	Source entity Specify labels,such as "href": "/orgs/14/labels/42" "href": "/orgs/14/labels/43"
destination	Destination entity Specify an IP list, such as "href": "/orgs/14/sec_policy/active/ip_lists/14"
network	The network that the source and destination are on
services	Port and protocol, and optional process or Windows service names, of matching rules

Response Properties

In the release 23.5, in `sec_policy_rule_coverage_post_response` a new array `rule_edges` was added, which provides a list with a placeholder for each requested source and destination pair.

The previous object `rules` is replaced with a reference to `"$ref": "#/definitions/rule_href_mapping"`, and the previous array `edges` is replaced with a reference to `"$ref": "#/definitions/rule_edges"`.

```
"rule_edges": {
    "type": "array",
    "description": "A list with a placeholder for each requested source and
destination pair",
    "items": {
       "type": "array",
       "description": "A list with with a placeholder for each requested
service
                        (per source and destination pair)",
    "items": {
       "type": "array",
       "description": "A list of indexes of matching rules
                        (for each service per source and destination
pair)",
    "items": {
       "type": "string",
       "pattern": "^[0-9]+$"
       }
     }
}
```

Before the release 23.5, the response was as follows:

Parameter	Description
`rules`	The rules returned in the API response are rules with network_type (such as `non-brn`) that apply to the given input, such as: "0": { "href": "/orgs/14/sec_policy/draft/rule_sets/21/sec_rules/220" }, "1": { "href": "/orgs/14/sec_policy/draft/rule_sets/21/sec_rules/223" }, "2": { "href": "/orgs/14/sec_policy/draft/rule_sets/21/sec_rules/237" }
`edges`	[[["0", "1", "2"]]]

Virtual Services and Service Bindings

This Public Stable API gives you the ability to write rules on a per-service basis instead of having to write rules that apply to all the services running on a workload. By binding a workload to individual services, you can isolate one or more services running on a workload and create policies specific to those services. By binding services, you have the flexibility to create a finely-grained, highly-segmented security policy.

Once you have created, provisioned, and bound a virtual service to a specific workload, you can use the virtual service in rules. See Create an Individual Virtual Service [204]and Virtual Service Bindings [207] for information.

Virtual Services

Virtual services can consist of a single service or a collection of explicitly enumerated port/port range and protocol tuples. They can be used directly in a rule as a single entity or labels that represent multiple virtual services can be used to write rules.

Virtual services are dynamically bound to workloads using service bindings. Create a virtual service, and then use a service binding to bind the specific virtual service to a workload. Rules written using a virtual service only apply to the workload to which the service is bound.

Use virtual services in the following scenarios:

- **Apply Rules to a Single Service**
  This scenario represents a service or process on a workload using a name or label. You can write a policy that allows other entities to communicate only with that single service. The policy does not need to change if the service is moved to a different workload or a new set of workloads. Only the workload bindings on the virtual service need to be changed. The PCE dynamically calculates the required rules on the updated workloads to allow this virtual service.
- **Applying Rules to one of the many Virtual Services Running on a Workload**
  In this case, multiple virtual services are running on the workload with different labels, and the rule targets a subset of those services. You can write a rule to allow other entities to communicate only with that specific service. The policy does not need to change if this service is moved to a different workload or a new set of workloads. Only the workload

bindings on the virtual service need to be changed. The PCE dynamically calculates the required rules on the updated workloads to allow the virtual service.

Virtual Services API Methods

Functionality	HTTP	URI
Get a collection of virtual services.	`GET`	`[api_version][org_href]/sec_policy/: pversion/virtual_services`
Get an individual virtual service.	`GET`	`[api_version][org_href]/sec_policy/: pversion/virtual_services/virtual_service_id`
Create a new virtual service.	`POST`	`[api_version][org_href]/sec_policy/ draft/virtual_services`
Create a collection of virtual services.	`PUT`	`[api_version][org_href]/sec_policy/ draft/virtual_services/bulk_create`
Update a virtual service.	`PUT`	`[api_version][org_href]/sec_policy/ draft/virtual_services/virtual_service_id`
Update a collection of virtual services.	`PUT`	`[api_version][org_href]/sec_policy/ draft/virtual_services/bulk_update`
Delete a virtual service.	`DELETE`	`[api_version][org_href]/sec_policy/ draft/virtual_services/virtual_service_id`

Active vs. Draft Policy Items

Because virtual services are policy items, changes must be provisioned before they can affect your policy. Policy items always exist in either a `draft` (not provisioned) or `active` (provisioned) state.

Security policy items that must be provisioned to take effect include IP lists, rulesets, rules, services, virtual services, label groups, user groups, virtual servers, and PCE security settings.

For these items, the URL of the API call must include the URI element called `:pversion`, which can be set to either `draft` or `active` when you make the API call.

Depending on the method, the API follows these rules:

- For GET operations — `:pversion` can be `draft` or `active`
- For POST, PUT, DELETE — `:pversion` can only be `draft` (you cannot operate on provisioned items)

Query Parameters

Property	Description	Type	Required
org_id	Organization ID	Integer	Yes
pversion	Security Policy Version	String	Yes
external_data_reference	A unique identifier within the external data source. For example, if this virtual service information is stored in an external database.	String, NULL for PUT only	
external_data_set	The data source from which the resource originates. For example, if this virtual service information is stored in an external database.	String	
name	Name on which to filter. Supports partial matches	String	No
labels	List of lists of label URIs, encoded as a JSON string	String	No
virtual_service_id	Virtual Service ID	String	Yes
service	Service URI	String	No
service_ports.port	Specify port or port range to filter results. The range is from -1 to 65535.	String	No
service_ports.proto	Protocol to filter on.	Integer	No
service_address.fqdn	FQDN configured under service_address property supports partial matches	String	No
service_address.ip	IP address configured under service_address property supports partial matches	String	No
usage	Include Virtual Service usage flags.	Boolean	No

Virtual Services Properties

Property	Description	Type
`href`	URI of the virtual service	String
`created_at`	Timestamp when this virtual service was first created	String date/time
`updated_at`	Timestamp when this virtual service was last updated	String date/time
`deleted_at`	Timestamp when this virtual service was deleted	String/NULL date/time
`name`	Name (does not need to be unique)	String
`labels`	Virtual service labels References `common/label_optional_key_value.schema.json`	
`update_type`	Update type for the virtual service Reference to `common/sec_policy_update_type.schema.json`	
`external_data_set`	The data source from which the resource originates. For example, if this virtual service information is stored in an external database.	String, NULL for PUT only
`external_data_reference`	A unique identifier within the external data source. For example, if this virtual service information is stored in an external database.	String, NULL for PUT only
`service_addresses`	Reference to `virtual_service_service_addresses.schema.json`	
`ip_overrides`	Array of IPs or CIDRs as IP overrides	

Get a Collection of Virtual Services

Use this method to get a collection of Virtual Services.

URI to Get a Collection of Virtual Services

```
GET [api_version][org_href]/sec_policy/:pversion/virtual_services
```

Curl Command

```
curl -i -X GET https://pce.my-company.com:8443/api/v2/orgs/7/sec_policy/
active/virtual_services -H "Accept: application/json" -u $KEY:$TOKEN
```

Response

Each individual virtual service returned is identified by the virtual service HREF. To GET, PUT, or DELETE an individual virtual service, identify the service by its HREF in the API call.


```
[
  {
    "href": "/orgs/7/sec_policy/draft/virtual_services/1828d8ff-
aeb7-4735-9975-db692813d193",
    "created_at": "2017-10-29T19:41:15.648Z",
    "updated_at": "2017-10-29T19:41:15.648Z",
    "deleted_at": null,
    "created_by": {"href": "/users/14"},
    "updated_by": {"href": "/users/14"},
    "deleted_by": null,
    "update_type": null,
    "name": "Jawoo",
    "description": null,
    "service": { "href": "/orgs/7/sec_policy/draft/services/99" },
    "labels": [
      { "href": "/orgs/7/labels/88" },
      { "href": "/orgs/7/labels/82" },
      { "href": "/orgs/7/labels/92" },
      { "href": "/orgs/7/labels/101" }
    ],
    "ip_overrides": [
      "192.0.1.0",
      "192.168.100.0/24"
    ],
    "apply_to": "host_only"
  }
]
```


Get an Individual Virtual Service

Use this method to get an individual virtual service. In the call, you identify the virtual service by its HREF, which can be obtained when you get a collection of virtual services.

Use the following query parameters to restrict the results of the query:

URI to Get an Individual Virtual Service

```
GET [api_version][virtual_service_href]
```

NOTE

For this method, you can specify either `draft` or `active` for `:pversion`.

Curl Command

```
curl -i -X GET https://pce.my-company.com:8443/api/v2/orgs/2/sec_policy/
draft/virtual_services/89 -H "Accept: application/json" -u $KEY:$TOKEN
```

Response

```
{
    "href": "/orgs/2/sec_policy/draft/virtual_services/6005a35a-1598-4c7b-
a827-be4390f46773",
    "created_at": "2017-12-11T20:56:28.629Z",
    "updated_at": "2017-12-11T21:07:10.407Z",
    "deleted_at": null,
    "created_by": { "href": "/users/9" },
    "updated_by": { "href": "/users/9" },
    "deleted_by": null,
    "update_type": "create",
    "name": "Docker1",
    "description": null,
    "service": { "href": "/orgs/2/sec_policy/draft/services/5" },
    "labels": [
      { "href": "/orgs/2/labels/18" },
      { "href": "/orgs/2/labels/26" },
      { "href": "/orgs/2/labels/126" }
    ],
    "ip_overrides": [
      "192.0.1.0",
      "192.168.100.0/24"
    ],
    "apply_to": "internal_bridge_network"
  }
```

Create an Individual Virtual Service

Use this method to create an individual virtual service. Because a virtual service is a policy item, you must create it in the draft state and then provision the change using the Security Policy API.

Once the virtual service is provisioned, you can use the service binding method to bind the virtual service to a workload.

URI to Create an Individual Virtual Service

```
POST [api_version][org_href]/sec_policy/draft/virtual_services
```

Request Body

To create a virtual service, you need the HREF of the service you want to “bind” to a workload. You can obtain a service HREF by calling a GET collection with the service binding API.

Additionally, if you want to add labels to the virtual service, you need the HREF of each label you want to add. Label HREFs can be obtained by calling a GET collection with the labels API. Labels are represented in the JSON request body as an array, opened and closed by square brackets (`[ ]`).

```
{
  "name": "MyVirtualService",
  "description": "Test",
  "service": { "href": "/orgs/7/sec_policy/draft/services/218" },
  "labels": [
    { "href": "/orgs/7/labels/88" },
    { "href": "/orgs/7/labels/82" },
    { "href": "/orgs/7/labels/92" },
    { "href": "/orgs/7/labels/95" }
  ]
}
```

Curl Command

To create a new virtual service:

```
curl -i -X POST https://pce.my-company.com:8443/api/v2/orgs/2/
virtual_services -H "Content-Type: application/json" -u $KEY:$TOKEN.-d
'{ "name": "MyVirtualService", "description": "Test", "service": {"href": "/
orgs/7/sec_policy/draft/services/218"}, "labels": [{"href": "/orgs/7/labels/
88"}, {"href": "/orgs/7/labels/82"}, {"href": "/orgs/7/labels/92"},
{"href": "/orgs/7/labels/95" }]}'
```

Create or Update Virtual Services Collection

This method enables you to create a collection of virtual services in your organization using a single API call instead of creating individual services one at a time.

This capability is useful if you want to keep a set of PCE resources in sync with your internal representation of the resources, such as a configuration management database (CMDB) that holds the “source of truth” for your PCE resources.

After virtual services are created and the identifiers added to the service properties, you can get a collection of virtual services using query parameters that include the external data reference. You can also run an asynchronous query to get all virtual services through an offline job, which includes the external data references in the response.

The two properties you can use when creating virtual services, `external_data_set` and `external_data_reference` are UTF-8 strings with a maximum length of 255 characters. The contents must form a unique composite key, meaning that both values of these properties are treated as a unique key. These two properties together are recognized as a unique key, even if one of them is left blank or set to zero.

URI to Create a Collection of Virtual Services

```
PUT [api_version][org_href]/sec_policy/draft/virtual_services/bulk_create
```

URI to Update a Collection of Virtual Services

```
PUT [api_version][org_href]/sec_policy/draft/virtual_services/bulk_update
```

Request Body

To create a collection of virtual services, pass a JSON object that describes the details of the virtual service. This method's request body and curl command follow the same structure used to create an individual virtual service; you only add multiple virtual service JSON objects instead of just one.

Additionally, the `href` field must be present in the body for each virtual service you update in the `bulk_update`.

NOTE

Bulk operations are rate-limited to 1,000 items per operation.

Update an Individual Virtual Service

To update (PUT) an individual virtual service, you need to know the HREF of the virtual service you want to update. Virtual service HREFs are returned when you get a collection of virtual services.

URI to Update an Individual Virtual Service

```
PUT [api_version][org_href]/sec_policy/draft/virtual_services/
virtual_service_id
```

Request Properties

The request properties for updating a virtual service are the same as those for creating a virtual service [204].

Request Body

This example request body can be passed to update a virtual service to include a workload binding:

```
{
  "service": { "href": "/orgs/2/sec_policy/draft/services/91" },
  "labels": [
    { "href": "/orgs/2/labels/316" },
    { "href": "/orgs/2/labels/101" },
    { "href": "/orgs/2/labels/102" },
    { "href": "/orgs/2/labels/103" }
  ]
}
```

Curl Command

```
curl -i -X PUT https://pce.my-company.com:8443/api/v2/orgs/2/
sec_policy/draft/virtual_services/256525b6-e7c5-4ad7-b7af-e70586aa1078
-H "Content-Type: application/json" -u $KEY:$TOKEN
```

```
-d '{"name":"test","description":null,"service":{"href":"/orgs/2/labels/
316"},"labels": [{"href":"/orgs/2/labels/101"}, {"href":"/orgs/2/labels/
102"}, {"href":"/orgs/2/labels/103"}]}'
```

Virtual Service Bindings

After you create a virtual service and provision it, use the service binding API to bind the virtual service to a workload. When you apply your policy to a virtual service, the virtual service must be bound to a workload where that service is running. You can only specify one workload and one virtual service per service binding.

When you bind a virtual service to a workload with a service binding, you must specify the workload to which you want to bind the service. You can also optionally specify any port overrides if you want the virtual service to communicate over a different port than the default.

Unlike virtual services, the service binding API does not require provisioning to take effect.

NOTE

Updating service bindings doesn't use a PUT method. To update, delete, and then POST a new service binding to replace it.

Service Binding API Methods

Functionality	HTTP	URI
Get a collection of service bindings.	`GET`	`[api_version][org_href]/service_bindings`
Get an individual service binding.	`GET`	`[api_version][service_binding_href]`
Create a service binding.	`POST`	`[api_version][org_href]/service_bindings`
Delete an individual service binding.	`DELETE`	`[api_version][service_binding_href]`

Service Bindings Query Parameters

Parameter	Description	Type	Required
`org_id`	Organization ID	Integer	Yes
`virtual_service`	Virtual service href	String	No
`service_binding_id`	Service Binding ID	String	Yes
`workload`	The complete HREF of the workload referenced in the service binding.	String	No
`external_data_reference`	A unique identifier within the external data source. For example, if this virtual service information is stored in an external database.	String	No
`external_data_set`	The data source from which the resource originates. For example, if this virtual service information is stored in an external database.	String	No

Service Bindings Properties

Property	Description	Type
`virtual_service`	Virtual service href, required for POST	Object
`bound_serviuce`	Bound service href, required for GET	Object
`workload`	The complete HREF of the workload referenced in the service binding.	String
`port_overrides`	Reference to `port_overrides.schema.json`	
`external_data_reference`	A unique identifier within the external data source. For example, if this virtual service information is stored in an external database.	String, NULL
`external_data_set`	The data source from which the resource originates. For example, if this virtual service information is stored in an external database.	String, NULL
`workload`	HREF of the workload	String

Create a Service Binding

This method creates one or more service bindings, which associate (or “bind”) a virtual service to a workload. When you call this method, you specify the virtual service and workload you want to bind, plus you can optionally specify port overrides to use a different port for the service.

The JSON request body for creating a service binding is an array, which allows you to create multiple service bindings with a single POST.

Before you create a service binding, make sure that the virtual service you want to bind to a workload has been published and is in the active policy state.

URI to Create a Service Binding

```
POST [api_version][org_href]/service_bindings
```

Request Parameters

The request body for creating a service binding is an array of service binding objects. Because this JSON request body is an array, you can create multiple service bindings in a single POST.

NOTE

Ensure that the virtual service you bind to a workload has been provisioned.

This is an example JSON representation of a single service binding:

```
[{"workload": {"href": "/orgs/1/workloads/
45c69cf3-4cbb-4c96-81ee-70e94baea1b8"}, "virtual_service":
{"href": "/orgs/1/sec_policy/draft/virtual_services/a735332e-5d31-4899-a3a5-
fac7055e05c0"}, "port_overrides": [{"port": 14000, "protocol": 6,
"new_port": 26000 }]}]
```

Curl Command

To create a single service binding:

```
curl -i -X POST https://pce.my-company.com:8443/api/v2/
orgs/2/service_bindings -H "Content-Type:application/json"
-u $KEY:$TOKEN -d '[{"workload":{"href":"/orgs/1/workloads/
45c69cf3-4cbb-4c96-81ee-70e94baea1b8"}, "virtual_service":{"href":"/orgs/1/
sec_policy/draft/virtual_services/a735332e-5d31-4899-a3a5-fac7055e05c0"},
"port_overrides":[{"port":14000,"protocol":6,"new_port":26000}]}]'
```

Request Body to Create Multiple Service Bindings

An example JSON request body for creating multiple service bindings with a different port number:

```
[{"workload": {"href": "/orgs/1/workloads/820efcdc-
c906-46b9-9729-26bab7a53223"}, "virtual_service": {"href": "/orgs/1/
sec_policy/draft/virtual_services/e38ce044-d2ac-4d7f-aeec-16ef8fbd0b15"},
"port_overrides": [ {"port": 10000, "protocol": 6, "new_port":
26000 } ]}, {"workload": {"href": "/orgs/1/workloads/820efcdc-
c906-46b9-9729-26bab7a53223"}, "virtual_service": {"href": "/orgs/1/
sec_policy/draft/virtual_services/e38ce044-d2ac-4d7f-aeec-16ef8fbd0b15"},
"port_overrides": [ {"port": 11000, "protocol": 6, "new_port": 25000} ]}]
```

Service Binding Request Body

If you create more than one service binding with a single POST, all of the service bindings must be constructed properly or the POST will fail and no service bindings will be created.

NOTE

The " failure " response indicates the error, but it does not confirm that no service bindings have been created.

For example, if you use POST to create 10 service bindings and one of the workloads referenced in the JSON payload uses an incorrect URI (HREF), the POST fails with an error message similar to the following message:

```
[ { "token": "invalid_uri", "message": "Invalid URI: {/orgs/1/workloadzzz/
820efcdc-c906-46b9-9729-26bab7a53223}" } ]
```

Get Individual or Collection of Service Bindings

You can use these methods to get one or more service bindings.

URI to Get a Collection of Service Bindings

```
GET [api_version][org_href]/service_bindings
```

URI to Get an Individual Service Binding

```
GET [api_version][service_binding_href]
```

Response Body

```
[
   {
     "href": "/orgs/7/service_bindings/287568ad-4a1f-4000-a9fb-
e67d1dabce15",
     "virtual_service": {"href": "/orgs/7/sec_policy/active/
virtual_services/256525b6-e7c5-4ad7-b7af-e70586aa1078"},
     "workload": {"href": "/orgs/7/workloads/baef2547-2036-4e00-
b6f7-3f4be1f7669a",
     "name": null,
     "hostname": "AssetMgt-proc2",
     "deleted": false },
     "port_overrides": [{"new_port": 8080,"protocol": 6,"port": 3306}]
     },
        {
           "href": "/orgs/7/service_bindings/
faebe7bf-0bb7-49a5-868e-8297e038fa9e",
           "virtual_service": {"href": "/orgs/7/sec_policy/active/
virtual_services/7b46fce0-4933-4e29-b86c-7a2a71e686ed"},
           "workload": {"href": "/orgs/7/workloads/aee4381b-9836-45b6-b7ab-
aee246bf482f",
           "name": null,
           "hostname": "onlinestore-web2",
           "deleted": false },
           "port_overrides": []
         },
```

```
        {
          "href": "/orgs/7/service_bindings/924ad8c2-94bf-40f5-
bc4c-13474982bd00",
          "virtual_service": {"href": "/orgs/7/sec_policy/active/
virtual_services/256525b6-e7c5-4ad7-b7af-e70586aa1078"},
          "workload": {"href": "/orgs/7/workloads/69fd736b-cd21-4a4c-
bdb9-132207c760ce",
          "name": null,
          "hostname": "test-us",
          ": false },
          "port_overrides": []
        }
]
```

Curl Command to Get an Individual Service Binding

```
curl -i -X GET https://pce.my-company.com:8443/api/v2/orgs/2/
service_bindings/xxxxxxxx-4a86-4dd4-b303-23f699d0ebbf -H "Accept:
application/json" -u $KEY:$TOKEN
```

Curl Command to Get Service Binding Collection

```
curl -i -X GET https://pce.my-company.com:8443/api/v2/orgs/2/
service_bindings -H "Accept: application/json" -u $KEY:$TOKEN
```

Delete an Individual Service Binding

To delete both the service bindings and virtual services, delete the service bindings first, then delete the virtual services.

URI to Delete an Individual Service Binding

```
DELETE [api_version][service_binding_href]
```

Curl Command to Delete a Service Binding

Use this curl command to delete the service binding:

```
curl -i -X DELETE https://pce.my-company.com:8443/api/v2/orgs/2/
service_bindings/xxxxxxxx-4a86-4dd4-b303-23f699d0ebbf -u $KEY:$TOKEN
```

Virtual Servers

A virtual server is similar to a workload. It can be assigned labels and has IP addresses, but does not report traffic to the Illumio Core. Each virtual server has only one VIP. The local IP addresses are used as source IP addresses for connections to the pool members (backend servers) when the virtual server is operating in SNAT mode or Auto mode. These IP addresses are likely to be shared by multiple virtual servers on the server load balancer.

A discovered virtual server is a server load balancer (SLB) virtual server (IP address and port(s)) that the NEN has discovered when interrogating SLBs managed by the PCE.

For the topic overview and more details, see the Security Policy Guide, Load Balancers, and Virtual Servers.

Virtual Server Methods

There are two groups of methods used to manage virtual servers:

- Methods for virtual servers
- Methods for discovered virtual servers

Virtual Servers

Virtual Server Methods

Functionality	HTTP	URI
Get a list of Virtual Servers.	`GET`	`[api_version][org_href]/sec_policy/:version/virtual_servers`
Get a specified Virtual Serve.r	`GET`	`[api_version][org_href]/sec_policy/:version/virtual_servers/:uuid`
Create a Virtual Server objec.t	`POST`	`[api_version][org_href]/sec_policy/:version/virtual_servers`
Modify the enforcement mode, labels, and backend/provider labels of a specified Virtual Server.	`PUT`	`[api_version][org_href]/sec_policy/:version/virtual_servers/:uuid`

Query Parameters for Virtual Servers

Parameter	Description	Type	Required
`org_id`	Organization ID	Integer	Yes
`pversion`	Security Policy Version	String	Yes
`discovered_virtu-al_server`	URI of the discovered virtual server to filter by	String	No
`active_pce_fqdn`	FQDN of the PCE	String	No
`external_data_reference`	A unique identifier within the external data source	String	No
`external_data_set`	The data source from which a resource originates	String	NO
`labels`	2D array of label URIs encoded as a JSON string. Filter by virtual server labels.	String	No
`max_results`	Maximum number of discovered virtual servers to re-turn	Integer	No
`mode`	Mode of the virtual server(s) to return	String	No
`name`	Name of virtual server(s) to return. Supports partial matches	String	No
`network_enforce-ment_node.hostname`	Hostname of NEN object to filter virtual server(s)v	String	No
`slb`	URI of SLB object to filter virtual server(s)	String	No
`vip`	Frontend (VIP) address of the virtual server(s). Sup-ports suffix-wildcard matches	String	No
`vip_port`	Port of frontend VIP of the virtual server(s)	Integer	No
`vip_proto`	Protocol of frontend VIP of the virtual server(s)	Integer	No

Properties for Virtual Servers :

Property	Description	Type	Required
`href`	href of virtual server	String	Yes
`name`	The short friendly name of the virtual server	String	Yes
`labels`	2D array of label URIs, encoded as a JSON string. Filter by virtual server labels. "$ref": "../common/label_optional_key_value.schema.json"	Array	Yes
`service`	URI of associated service "$ref": "../common/href_object.schema.json"		Yes
`providers`	minItems: 0, label: "$ref": "../common/label_optional_key_value.schema.json" workload: "$ref": "../common/href_object.schema.json"	Array	Yes
`mode`	Management mode of the virtual server	String	Yes
`discovered_virtual_server`	Corresponding discovered virtual server, server URI	String/ Null	Yes
`update_type`	Reference to `common/sec_policy_update_type.schema.json`		Yes
`created_at`	The time (rfc3339 timestamp) at which this virtual server was created	String	Yes
`updated_at`	The time (rfc3339 timestamp) at which this virtual server was last updated	String	Yes
`deleted_at`	The time (rfc3339 timestamp) at which this virtual server was deleted	String/ Null	Yes
`created_by`	The URI of the user who created this virtual server Reference to `common/href_object.schema.json`		Yes
`updated_by`	The URI of the user who last updated this virtual server Reference to `common/href_object.schema.json`		Yes
`deleted_by`	The URI of the user who deleted this virtual server Reference to `common/nullable_href_object.schema.json`		Yes

Discovered Virtual Servers

Discovered Virtual Servers Methods

You can use only three GET methods for discovered virtual servers.

Functionality	HTTP	URI
Get a list of Discovered Virtual Servers.	GET	[api_version][org_href]/discovered_virtual_servers
Get a specified Discovered Virtual Serve.r	GET	[api_version][org_href]/discovered_virtual_servers/:uuid
Discovery on-demand: list the discovered virtual servers	GET	[api_version][org_href]/network_enforcement_nodes/virtual_server_discovery_jobs/:uuid

Discovered Virtual Servers Parameters

Parameter	Description	Type	Required
org_id	Organization ID	Integer	Yes
active_pce_fqdn	FQDN of the PCE	String	No
has_virtual_server	Filter discovered virtual server(s) by whether they are managed by a virtual server object	Boolean	No
max_results	Maximum number of discovered virtual servers to return	Integer	No
name	Name of discovered virtual server(s) to return. Supports partial matches	String	No
network_enforcement_node	Hostname of NEN object to filter discovered virtual server(s)	String	No
slb	URI of SLB object to filter discovered virtual server(s)	String	No
vip	Frontend (VIP) address of the discovered virtual server(s). Supports suffix-wildcard matches	String	No
vip_port	Port of frontend VIP of the discovered virtual server(s)	Integer	No
vip_proto	Protocol of frontend VIP of the discovered virtual server(s)	Integer	No
virtual_server	URI of virtual server to filter discovered virtual server(s)	String	No
virtual_server_labels	2D array of label URIs, encoded as a JSON string. Filter by virtual server labels. Requires usage of has_virtual_server: true	String	No
virtual_server_mode	The filter discovered virtual server(s) in virtual server mode. Requires usage of has_virtual_server: true	String	No

Discovered Virtual Server Properties

Property	Description	Type	Required
`href`	href of discovered virtual server	String	Yes
`dvs_identifier`	NFC-generated unique identifier for discovered virtual server	String	Yes
`name`	Configured name of the virtual server	String	Yes
`vip_port`	VIP including protocol and port for the discovered virtual server. Reference to `common/dvs_vip_port.schema.json`		Yes
`local_ips`	Local IPs of virtual server Format: ipv4	Array	Yes
`mode`	Virtual server mode of operation	String	Yes
`slb`	URI of Service Load Balancer (SLB) object to filter discovered virtual server(s) Reference to `common/href_object.schema.json`		Yes
`service_checks`	Service checks, which has these properties: • `protocol` • `port`	Object	Yes
`nfc`	DEPRECATED AND REPLACED (USE 'network_enforcement_node' INSTEAD) URI of the NFC for this discovered virtual server Reference to `common/href_object.schema.json`		Yes
`created_at`	The time (rfc3339 timestamp) at which this server load balancer was created	date/time	Yes
`updated_at`	The time (rfc3339 timestamp) at which this server load balancer was last updated	date/time	Yes
`created_by`	Reference to `common/href_object.schema.json`		Yes
`updated_by`	Reference to `common/href_object.schema.json`		Yes
`network_enforcement_node`	URI of the Network Enforcement Node for this discovered virtual server Reference to `common/href_object.schema.json`		Yes

IP Lists

This Public Stable API can get, create, update, and delete IP lists.

IP lists can be used in rules to define sets of trusted IP addresses, IP address ranges, or CIDR blocks allowed into your data center that are allowed to access workloads in your network.

IP Lists API

Functionality	HTTP	URI
Get a collection of IP lists.	`GET`	`[api_version][org_href]/sec_policy/draft/ip_lists`
Get an individual IP list.	`GET`	`[api_version][ip_list_href]`
Create an IP list	`POST`	`[api_version][org_href]/sec_policy/draft/ip_lists`
Update an IP list	`PUT`	`[api_version][ip_list_href]`
Delete an IP list	`DELETE`	`[api_version][ip_list_href]`

Active vs Draft

This API operates on provisionable objects, which exist in either a `draft` (not provisioned) state or an `active` (provisioned) state.

Provisionable items include label groups, services, rulesets, IP lists, virtual services, firewall settings, enforcement boundaries, and virtual servers. For these objects, the URL of the API call must include the element called `:pversion`, which can be set to either `draft` or `active`.

Depending on the method, the API follows these rules:

- For GET operations — `:pversion` can be draft, active, or the ID of the security policy.
- For POST, PUT, DELETE — `:pversion` can be draft (you cannot operate on active items) or the ID if the security policy.

Get IP Lists

This API allows you to get an organization's collection of IP lists or a single IP list.

By default, the maximum number returned on a GET collection of IP lists is 500. If you want to get more than 500 IP lists, use an Asynchronous GET Collection.

URI to Get Collection of IP Lists

```
GET [api_version][org_href]/sec_policy/draft/ip_lists
```

URI to Get an Individual IP List

```
GET [api_version][ip_list_href]
```

Query Parameters

Parameter	Description	Type	Required
`org_id`	Organization	Integer	Yes
`pversion`	Security Policy Version	String	Yes
`description`	Description of IP list(s) to return. Supports partial matches	String	No
`external_data_set`	The data source from which the resource originates. For example, if this workload information is stored in an external database.	String	No
`external_data_reference`	A unique identifier within the external data source. For example, if this workload information is stored in an external database.	String	No
`ip_address`	IP address matching the IP lists to return. Supports partial matches.	String	No
`fqdn`	IP lists matching FQDN. Supports partial matches	String	No
`max_results`	The maximum number of results you want to return when using the GET method. The maximum limit for returned IP lists is 500.	Integer	No
`name`	Name of IP list(s) to return. Supports partial matches	String	No
`ip_list_id`	IP list ID (for `[api_version][ip_list_href]`	String	Yes

Properties

Property	Description	Type	Required
`href`	URI of the ip list	String	Yes
`name`	The name of the IP lists to return has to be unique.	String	Yes
`description`	Description of IP list(s) to return. Supports partial matches	String	No
`external_data_set`	The data source from which the resource originates. For example, if this workload information is stored in an external database.	String, Null	No
`external_data_reference`	A unique identifier within the external data source. For example, if this workload information is stored in an external database.	String, Null	No
`fqdns`	Collection of FQDNs.	Array. Required: `fqdn`	No
`ip_list_id`	IP list ID (for `[api_version][ip_list_href]`	String	Yes

Curl Command to Get Collection of IP Lists

```
curl -i -X GET https://pce.my-company.com:8443/api/v2/orgs/3/sec_policy/
draft/ip_lists -H "Accept: application/json" -u $KEY:$TOKEN
```

Response Body

```
{
     {
        href: "/orgs/2/sec_policy/draft/ip_lists/309"
        id: 309
        created_at: "2020-04-17T21:59:44Z"
        updated_at: "2020-04-17T21:59:44Z"
        deleted_at: null
        created_by: {
            href: "/users/76"
     }
        updated_by: {
            href: "/users/76"
     }
        deleted_by: null
        name: "Good IPs 2"
        description: null
        ip_ranges: [
            {
               description: "My good IPs for web app"
               from_ip: "192.0.2.0"
```

```
                to_ip: null
            }
        ]
}
```

Curl Command to Get an IP List

```
curl -i -X GET https://pce.my-company.com:8443/api/v2/orgs/3/sec_policy/
draft/ip_lists/312 -H "Accept: application/json" -u $KEY:$TOKEN
```

Create an IP List

This API allows you to create IP lists (allowlists) so they can be used for creating rules in rulesets. An IP list can contain a single IP address or an IP address range.

NOTE

Denylist IP lists are not supported in this release.

WARNING

Please be aware of the following:

WARNING

0.0.0.0/0 means 0-255 . 0-255 . 0-255 . 0-255 or all possible IP addresses.

WARNING

0.0.0.0 without the trailing "/0", means a single IP (not ANY IP). This is a very rare but sometimes needed object, specifically for things like DHCP Discovery.

WARNING

0.0.0.0 when used improperly might trigger an error, prevent the list from being accepted, and consequently block traffic.

WARNING

Use the correct syntax for the intended purpose.

URI to Create an IP List

```
POST [api_version][org_href]/sec_policy/draft/ip_lists
```

Request Properties

Example JSON request body for a single IP list:

```
{
     "name": "Good IPs",
     "ip_ranges": [
           {
               "description": "Good IPs allowed to access app server",
               "from_ip": "192.0.2.0"
           }
     ]
}
```

Curl Command to Create IP List

```
curl -i -X POST https://pce.my-company.com:8443/api/v2/orgs/3/sec_policy/
draft/ip_lists -H "Accept: application/json" -u $KEY:$TOKEN -d '{"name":
"Good IPs", "ip_ranges":[{"description": "Good IPs allowed to access app
server", "from_ip": "192.0.2.0"}]}'
```

Response Body

```
{
     href: "/orgs/2/sec_policy/draft/ip_lists/316"
     created_at: "2020-04-18T00:19:55Z"
     updated_at: "2020-04-18T00:19:55Z"
     deleted_at: null
     created_by: {
          href: "/users/11"
     }
     updated_by: {
          href: "/users/11"
     }
     deleted_by: null
     name: "Good  IPs"
     description: null
     ip_ranges: [
         {
             description: "Good IPs"
             from_ip: "192.0.2.0"
             to_ip: null
         }
     ]
}
```

Update an IP List

This API updates a specific IP list identified by its HREF. Get a collection of IP lists to find IP list HREFs .

Example IP list HREF:

```
/orgs/2/sec_policy/draft/ip_lists/316
```

URI to Update an IP List

```
PUT [api_version][ip_list_href]
```

Example Request Body to Update an IP List

```
{
     "name": "Better IPs",
     "list_type": "allow",
     "ip_ranges": [
         {
             "description": "More allowed IPs for web app",
             "from_ip" : "192.0.2.0"
             "to_ip" : "24"
         }
     ]
}
```

Curl Command to Update IP List

```
curl -i -X PUT https://pce.my-company.com:8443/api/v2/orgs/3/sec_policy/
draft/ip_lists/312 -H "Content-Type: application/json" -u $KEY:$TOKEN
-d '{ "name": "Better IPs", "list_type": "allow", "ip_ranges":
[{"description": "Better IPs for web app", "from_ip": "192.0.2.0", "to_ip":
"24"}]}'
```

Delete an IP List

This API removes an IP list from an organization:

URI to Delete an API List

```
DELETE [api_version][ip_list_href]
```

Curl Command to Delete IP List

```
curl -i -X DELETE https://pce.my-company.com:8443/api/v2/orgs/2/sec_policy/
draft/ip_lists/316 -u $KEY:$TOKEN
```

Visualization

In addition to reviewing workloads and traffic with the PCE web console, you can analyze the traffic flows and get insight into the exposure to vulnerabilities using the Visualization API.

The Explorer API is used to search and analyze PCE traffic flows. It queries the PCE's traffic database and analyzes these flows for auditing, reporting, and troubleshooting. The VEN adds the DNS names to the flow summary logs and sends them to the PCE, while the Explorer API appends the DNS names to allow auditors and analysts to view them without performing reverse look-ups on random IP addresses.

Vulnerability Maps combine Illumio's Application Dependency Map with vulnerability data from Qualys Cloud Platform to provide insights into the exposure of vulnerabilities and attack paths across your applications.

Explorer

The Public Experimental Explorer APIs search and analyze PCE traffic flows for auditing, reporting, and troubleshooting. You can search for traffic flows between workloads or hosts, labeled workloads, or IP addresses, and you can restrict the search by specific port numbers and protocols.

There are three APIs for the traffic flows search:

Traffic Analysis Queries

This was the basic traffic analyzer for queries that is now deprecated.

Functionality	HTTP	URI
Search the PCE traffic data database to discover traffic patterns and write policy.	`POST`	`[api_version][org_href]/traffic_flows/traffic_analysis_queries`

The maximum of returned results when using `POST [api_version][org_href]/traffic_flows/traffic_analysis_queries` was 100,000, which is a reasonable number a user can view in the UI. However, when Explorer is used for capturing all traffic flows into a CSV file to build rules offline, the queries take longer to return, traffic data contains more than 100,000 rows, and so on. Explorer queries are required to support both the single-node and multi-node Explorer in the SuperCluster environment. Therefore, the limitation of 100,000 results was raised to 200,000 to better support SuperCluster environments in Explorer.

NOTE

This API is now DEPRECATED and replaced with Asynchronous Queries for Traffic Flows, where the `max-results` limit is raised from 100,000 to 200,000.

Asynchronous Queries for Traffic Flows

Async Queries API Methods

Functionality	HTTP	URI
Create a new async traffic query.	`POST`	`[api_version][org_href]traffic_flows/async_queries`
Get a collection of async traffic queries.	`GET`	`[api_version][org_href]traffic_flows/async_queries`
Download the completed async traffic query results.	`GET`	`[api_version][org_href]traffic_flows_async/queries/:uuid/download`
Update an async traffic query (request cancellation of the queued async query)	`PUT`	`[api_version][org_href]traffic_flows/async_queries/:uuid`
Delete the completed async traffic query.	`DELETE`	`[api_version][org_href]traffic_flows/async_queries/:uuid`

Create New Async Traffic Queries

Parameters for POST [api_version][org_href] traffic_flows/async_queries:

Property	Description	Type	Req
`query_name`	Name of the query	String	Yes
`start_date`	Starting date for the query. If left empty, the default interpretation is "today," which is "now" minus 24 hours.	Date-time string (`YYYY-MM-DDTHH:MM:SS`)	No
`end_date`	Ending date for the query. If left empty, the default interpretation is	Data-time string (`YYYY-MM-DDTHH:MM:SS`)	No
`sources`	Source labels, workloads, or IP addresses to include or exclude in the search. The response can contain up to five matching IP addresses. **NOTE:** The response returns `sources` as `consumers`. Sources are treated as consumers for the purposes of the request; the response returns the source of an individual flow as src. Sub-properties: • `include`: Targets that can be included are workloads, labels, or IP addresses identified by their HREF and structured as an array of JSON objects. If this property is left empty, then `include` means consider "ALL" or "ANY" of the object type. • `exclude`: Targets that can be excluded are workloads, labels, or IP addresses identified by their HREF and structured as a JSON array. • When IP List is present in the consumer part of a traffic query, traffic from workloads that belong to that IP List will not be returned by default. If users want to see that traffic, they need to set `exclude_workloads_ from_ip_list_query: false` • When IP List is present in the provider part of traffic query, traffic to workloads that belong to that IP List will not be returned by default. If the user wishes to see that traffic, they need to set `exclude_workloads_from_ip_ list_query: false`	Object	Yes Yes Yes
`destinations`	Target labels, workloads, or IP addresses to include or exclude in the search. The response returns `targets` as `providers`. Required sub-properties: • `include`: Targets that can be *included* are workloads, labels, or IP addresses identified by their HREF and structured as an array of JSON objects. If this property is left empty, then `include` means consider "ALL" or "ANY" of the object type.	Object	Yes Yes

Property	Description	Type	Req
	• `exclude`: Targets that can be *excluded* are workloads, labels, or IP addresses identified by their HREF and structured as a JSON array. If this property is left empty, then `exclude` means exclude "NONE" of the object types.		
`services`	Services (5-tuple of port/to_port/proto/process/service) to include or exclude. Not all properties of the service subobjects are required. Required properties: • `include`: List of included services (5-tuple of port/to_port/proto/process/service) • `exclude:` List of excluded services (5-tuple of port/to_port/proto/process/service)", Properties of the `include`and `exclude` subobjects: • `port`: Port Number (integer 0-65535). Also the starting port when specifying a range. • `to_port`: High end of port range inclusive if specifying a range. If not specifying a range then don't send this: • `proto`: Protocol number. For the expected proto values see IANA Protocol Numbers. • `process_name`: name of the process • `windows_service_name`: name of the Windows serviece		Yes
`policy_decisions`	List of policy decisions. Allows you to filter the query based on policy decision: • `allowed`: Allowed traffic. • `potentially_blocked`: Allowed but potentially blocked traffic. • `blocked`: Blocked traffic. • `unknown`	Array of strings	Yes
`boundary_decisions`	List of boundary decisions • `blocked`: blocked due to boundary • `override_deny_rule`: overridden deny rule • `blocked_non_illumio_rule`: Deny rule not written by Illumio	Array	
`max_results`	Maximum number of flows to return. Limit is 200,000	Integer	Yes
`exclude_workloads_from_ip_list_query`	Exclude workload traffic when IP List is provided either in consumer or provider part of the traffic query	Boolean	Default is: `true`

Download Completed async traffic Query Results

Properties for GET [api_version][org_href] traffic_flows/async_queries_download

Poperty	Description	Type	Req
`src`	Reference to `traffic_flows_endpoint.schema.json`		Yes
`dst`	Reference to `traffic_flows_endpoint.schema.json`		Yes
`service`	Reference to `traffic_flows_service.schema.json`		Yes
`num_connections`	The number of times this flow was seen	Integer	Yes
`policy_decision`	Policy decision made	String	Yes
`draft_policy_decision`	The draft policy decision of the flow (added in release 23.2.10)	String	No

`timestamp_range`	Timestamp ranges for the flow detected. Required properties are:
	`first_detected`
	`last_detected`
		Object	Yes

`caps`	Reference to `rbac_permission_types.schema.json`		Yes
`client_type`	The type of client that reported this flow	String	No

Introducing Illumination Plus

The API `GET [api_version][org_href]traffic_flows_async/queries/:uuid/dowload` has a new property: `caps`.

```
-------------------------------------------------------------
},
    "caps": {
        "description": "Array of permissions for the flow for the current
user",
        "type": "array",
        "items": {
        "$ref": "rbac_permission_types.schema.json"
    }
```

The `caps` property references the common schema `rbac_permission_types.schema.json`, which indicates the RBAC permission that is used: `write` .

rbac_permission_types.schema.json

```
{
    "$schema":"http://json-schema.org/draft-04/schema#",
    "type": "string",
        "description": "RBAC Permission types",
        "enum": ["write", "provision"]
}
```

In Illumination Plus, the type `provision` is not used to avoid additional delays when checking the permissions of each flow. Therefore, only permission `write` is used and further verification is handled on the UI side.

Examples

Example Async Explorer Queries

Curl command for POST traffic_flows_async_queries

```
curl -i -u
api_1195cf055cf8a834c:148afd87ecc980900eaf10d6c54e6c0f607b22e0dbf768dd007e51
e731096282 https://devtest0.ilabs.io:8443/api/v2/orgs/1/traffic_flows/
async_queries -H "Content-Type: application/json" -X POST -d '{"sources":
{"include":[[{"workload":{"href":"/orgs/1/workloads/a3ffb374-f6c6-4cce-
ac57-642c66f1498f"}}]],"exclude":[]},"destinations":{"include":
[[]],"exclude":[]},"services":{"include":[],"exclude":
[]},"sources_destinations_query_op":"and","start_date":"2016-01-29T17:04:03.
149Z","end_date":"2021-01-29T17:06:03.151Z","policy_decisions":
[],"max_results":1000,"query_name":"worklaod test"}'
```

Response:

```
 HTTP/1.1 202 Accepted
    content-location: 7734501b-74a2-47a4-9ded-77bf4ceea938
    content-type: application/json
    content-length: 615
    x-request-id: 00c8fa00-dbd8-4a28-a5c7-354fb5ae3886
    cache-control: no-store
    x-frame-options: DENY
    x-xss-protection: 1; mode=block
    x-content-type-options: nosniff
{"status":"queued","href":"/orgs/1/traffic_flows/async_queries/
7734501b-74a2-47a4-9ded-77bf4ceea938","created_by":{"href":"/users/
1"},"query_parameters":{"sources":{"include":[[{"workload":{"href":"/orgs/1/
workloads/a3ffb374-f6c6-4cce-ac57-642c66f1498f"}}]],"exclude":
[]},"destinations":{"include":[[]],"exclude":[]},"services":{"include":
[],"exclude":
[]},"sources_destinations_query_op":"and","start_date":"2016-01-29T17:04:03.
149Z","end_date":"2021-01-29T17:06:03.151Z","policy_decisions":
[],"max_results":1000,"query_name":"worklaod
test"},"created_at":"2021-04-09T20:50:30Z","updated_at":"2021-04-09T20:50:30
Z"}
```

Curl command for GET traffic_flows/async_queries

This query gets the collection of all async jobs for the current user, including anything that was already submitted.

```
curl -i -u
api_1195cf055cf8a834c:148afd87ecc980900eaf10d6c54e6c0f607b22e0dbf768dd007e51
e731096282 https://devtest0.ilabs.io:8443/api/v2/orgs/1/traffic_flows/
async_queries
```

Response

```
HTTP/1.1 200 OK
    content-type: application/json
```

```
    content-length: 1510
    x-request-id: fcf065e5-e465-4161-ba98-542182734c38
    cache-control: no-store
    x-frame-options: DENY
    x-xss-protection: 1; mode=block
    x-content-type-options: nosniff
[{"matches_count":1984,"flows_count":1000,"status":"completed","href":"/
orgs/1/traffic_flows/async_queries/88675fbd-a88e-44bd-
b358-2d6f2fc4f95a","result":"/orgs/1/traffic_flows/async_queries/88675fbd-
a88e-44bd-b358-2d6f2fc4f95a/download","created_by":{"href":"/users/
1"},"query_parameters":{"sources":{"include":[[{"workload":{"href":"/orgs/1/
workloads/a3ffb374-f6c6-4cce-ac57-642c66f1498f"}}]],"exclude":
[]},"destinations":{"include":[[]],"exclude":[]},"services":{"include":
[],"exclude":
[]},"sources_destinations_query_op":"and","start_date":"2016-01-29T17:04:03.
149Z","end_date":"2021-01-29T17:06:03.151Z","policy_decisions":
[],"max_results":1000,"query_name":"worklaod
tesrrrrrt"},"created_at":"2021-04-09T20:50:19Z","updated_at":"2021-04-09T20:
50:27Z"},
{"matches_count":1984,"flows_count":1000,"status":"completed","href":"/
orgs/1/traffic_flows/async_queries/
7734501b-74a2-47a4-9ded-77bf4ceea938","result":"/orgs/1/traffic_flows/
async_queries/7734501b-74a2-47a4-9ded-77bf4ceea938/download","created_by":
{"href":"/users/1"},"query_parameters":{"sources":{"include":[[{"workload":
{"href":"/orgs/1/workloads/a3ffb374-f6c6-4cce-
ac57-642c66f1498f"}}]],"exclude":[]},"destinations":{"include":
[[]],"exclude":[]},"services":{"include":[],"exclude":
[]},"sources_destinations_query_op":"and","start_date":"2016-01-29T17:04:03.
149Z","end_date":"2021-01-29T17:06:03.151Z","policy_decisions":
[],"max_results":1000,"query_name":"worklaod
test"},"created_at":"2021-04-09T20:50:30Z","updated_at":"2021-04-09T20:50:32
Z"
```

Curl command for GET traffic_flows/async_queries/:uuid

This query gets a specific job included in the collection.

```
curl -i -u $KEY:$TOKEN https://devtest0.ilabs.io:8443/api/v2/orgs/1/
traffic_flows/async_queries/88675fbd-a88e-44bd-b358-2d6f2fc4f95a
```

Response

```
HTTP/1.1 200 OK
    content-type: application/json
    content-length: 756
    x-request-id: f328b845-8542-4b96-a128-43aefdf7ba5a
    cache-control: no-store
    x-frame-options: DENY
    x-xss-protection: 1; mode=block
    x-content-type-options: nosniff
{"matches_count":1984,"flows_count":1000,"status":"completed",
"href":"/orgs/1/hanges for22.4.0 from the Wj/async_queries/88675fbd-
a88e-44bd-b358-2d6f2fc4f95a",
"result":"/orgs/1/traffic_flows/async_queries/88675fbd-a88e-44bd-
```

b358-2d6f2fc4f95a/download",
"created_by":{"href":"/users/1"},"query_parameters":{"sources":{"include":
[[{"workload":{"href":"/orgs/1/workloads/a3ffb374-f6c6-4cce-
ac57-642c66f1498f"}}]],"exclude":[]},"destinations":{"include":
[[]],"exclude":[]},"services":{"include":[],"exclude":
[]},"sources_destinations_query_op":"and","start_date":"2016-01-29T17:04:03.
149Z","end_date":"2021-01-29T17:06:03.151Z","policy_decisions":
[],"max_results":1000,"query_name":"worklaod
tesrrrrrt"},"created_at":"2021-04-09T20:50:19Z","updated_at":"2021-04-09T20:
50:27Z"}

Response for GET traffic_flows/async_queries/:uuid_download


```
{
   "dst": {
    "ip": "10.244.0.1",
    "workload": {
        "href": "/orgs/1/workloads/35d8efea-f230-4027-a8ee-5f20626c4d21",
        "name": "wl3",
        "labels": [
            {
            "key": "env"reserpine for
            "href": "/orgs/1/labels/7",
            "value": "Production"
            },
            {
            "key": "loc",
            "href": "/orgs/1/labels/11",
            "value": "Amazon"
            },
            {
            "key": "role",
            "href": "/orgs/1/labels/3",
            "value": "API"
            },
            {
            "key": "B-label",
            "href": "/orgs/1/labels/15",
            "value": "b_label_2"
            }
        ],
        "managed": false,
        "os_type": "linux",
        "endpoint": false,
        "hostname": "",
        "enforcement_mode": "visibility_only"
        }
    },
    "src": {
    "ip": "10.0.2.15",
    "workload": {
        "href": "/orgs/1/workloads/fc3801b8-05ec-4954-a957-7f5673123389",
        "name": "wl2",
        "labels": [
        {
```

```
            "key": "env",
            "href": "/orgs/1/labels/7",
            "value": "Production"
            },
            {
            "key": "loc",
            "href": "/orgs/1/labels/11",
            "value": "Amazon"
            },
            {
            "key": "role",
            "href": "/orgs/1/labels/3",
            "value": "API"
            }
        ],
        "managed": false,
        "os_type": "linux",
        "endpoint": false,
        "hostname": "",
        "enforcement_mode": "visibility_only"
        }
    },
    "caps": [],
    "state": "snapshot",
    "dst_bi": 0,
    "dst_bo": 0,
    "seq_id": 2,
    "network": {
    "href": "/orgs/1/networks/fbeeb98d-4ed6-428d-9f71-69f542bfd8fd",
    "name": "Corporate"
    },
    "service": {
    "port": 3306,
    "proto": 6
    },
    "flow_direction": "outbound",
    "num_connections": 1,
    "policy_decision": "unknown",
    "timestamp_range": {
    "last_detected": "2022-09-01T20:35:22Z",
    "first_detected": "2022-09-01T20:35:22Z"
    }
}
```


Filter for Managed Services

This API allows you to filter all managed services, such as workloads, virtual services, and so on.

Functionality	HTTP	URI
Get a list of Virtual Servers	GET	[api_version][org_href]/sec_policy/:version/virtual_servers
Get a specified Virtual Server	GET	[api_version][org_href]/sec_policy/:version/virtual_servers/:uuid

Database Metrics

The API Database Metrics provide organization-specific insight into the current traffic database. It allows you to monitor how big the traffic database is and how much data you can store. It also provides information about how many days of data is available.

The API database_metrics was expanded to include additional optional endpoint metrics: server, backlog , and endpoint.

These objects define the server's or endpoint's total flow data per organization for the total number of days, limit on the total number of days, oldest days, size in gigabytes, and so on.

Database Metrics API Methods

Functionality	HTTP	URI
Returns the organization database usage metrics. Provides customers organization-specific insight into current traffic database size (#days, #GB).	GET	[api_version][org_href]traffic_flows/database_metrics

Parameters for Database Usage Metrics

The organization flow Database Usage Metrics has the following required parameters:

Parameters	Description	Type	Required
`flows_days`	Organization's total number of days of flow data	Integer	Yes
`flows_days_limit`	Organization's limit on the total number of days of flow data The limit was increased from 90 to 97	Integer	Yes
`flows_oldest_day`	Organization's oldest day of flow data (yyyy-mm-dd)	String	No
`flows_size_gb`	Organization's limit on the total number of gigabytes of flow data	Number	Yes
`flows_size_gb_limit`	Organization's limit on the total number of gigabytes of flow data	Number	Yes
`server`	Define the server's total flow data per organization for the total numberof days, limit on the total number of days, oldest days, size in gigabytes, and so on.	Object	No
`endpoint`	Organization's total number of days of endpoint flow data.	Object	No
`backlog`	Total gigabytes used to store flow data input files	Object	No
`updated_at`	Timestamp in UTC when these flow metrics were generated	String, date	No

Parameters for `server`

Parameters	Description	Type
`num_flows_days`	Organization's total number of days of the server flow data	Integer
`num_flows_days_limit`	Organization's limit on the total number of days of server flow data	Integer
`flows_oldest_day`	Organization's oldest day of server flow data (yyyy-mm-dd)	String, date
`flows_size_gb`	Organization's limit on the total number of gigabytes of server flow data	Number
`flows_size_gb_limit`	Organization's limit on the total number of gigabytes of server flow data	Number
`num_daily_tables`	The number of server daily tables, including FlowLink and Cloud, counted once for each unique day.	Number
`num_weekly_tables`	The number of server weekly tables, including FlowLink and Cloud, counted once for each unique week.	Number

Parameters for `endpoint`

Parameters	Description	Type
`num_flows_days`	Organization's total number of days of the endpoint flow data	Integer
`num_flows_days_limit`	Organization's limit on the total number of days of endpoint flow data	Integer
`flows_oldest_day`	Organization's oldest day of endpoint flow data (yyyy-mm-dd)	String, date
`flows_size_gb`	Organization's limit on the total number of gigabytes of endpoint flow data	Number
`flows_size_gb_limit`	Organization's limit on the total number of gigabytes of endpoint flow data	Number
`num_daily_tables`	The number of endpoint daily tables is counted once for each unique day.	Number
`num_weekly_tables`	The number of endpoint weekly tables is counted once for each unique week.	Number

Parameters for `backlog`

Parameters	Description	Type
`total_disk_used_gb`	Total gigabytes used to store flow data input files	Number
`total_file_count`	Total number of flow data input files	Integer

An example response looks such as the following:


```
{
    "org_id":1,
    "server":{
        "flows_size_gb":2.53228759765625,
        "num_flows_days":95,
        "flows_oldest_day":"2023-02-06",
        "num_daily_tables":7,
        "num_weekly_tables":13,
        "flows_size_gb_limit":26,
        "num_flows_days_limit":90
    },
    "endpoint":{
        "flows_size_gb":0.34337615966796875,
        "num_flows_days":6,
        "flows_oldest_day":"2023-05-11",
        "num_daily_tables":6,
        "num_weekly_tables":0,
        "flows_size_gb_limit":26,
        "num_flows_days_limit":14
    },
    "flows_days":95,
    "flows_size_gb":2.8644485473632812,
    "flows_days_limit":90,
```

```
    "flows_oldest_day":"2023-02-06",
    "flows_per_second":0.0,
    "flows_size_gb_limit":26,
    "updated_at":"2023-05-16T22:36:25Z"
}
```


Reporting APIs

Reporting APIs allow users to generate application reports. Instead of first exporting generated data, such as traffic flows, and then using other tools to create reports, users can now use built-in reports.

Users can request one-time or recurring reports, specify time ranges, as well as report types.

Reporting APIs belong to several groups based on their use:

- Reporting Schedules [235]
- Report Templates [236]
- On-Demand Reports [237]

There is also a VEN Dashboard to help you visualize VEN statistics:

Reporting API Types

Reporting Schedules

These APIs allow the Global Organization Administrator (`this_global_org_user`) to manage report schedules.

Each report can be generated once or recurring, where the recurrence is specified during report configuration.

The default time range is 30 days, and other possible values are 1 day, 7 days, 14 days, 30 days, 60 days, and 90 days.

Functionality	HTTP	URI
Returns a collection of report schedules.	`GET`	`[api_version][org_href]/report_schedule`
Returns a scheduled report for the provided UUID.	`GET`	`[api_version][org_href]/report_schedule/:report_schedule_id`
Updates a report schedule for the provided UUID.	`PUT`	`[api_version][org_href]/report_schedule/:report_schedule_id`
Create a new report schedule.	`POST`	`[api_version][org_href]/report_schedule`
Deletes a report schedule for the provided UUID.	`GET`	`[api_version][org_href]/report_schedule/:report_schedule_id`

Request Parameters

Parameter	Description	Parameter Type	Format
`org_id`	Organization	path	Integer
`report_schedule_id`	UUID of the report schedule	Sring	date/time

Response Properties

Parameter	Description	Parameter Type
`href`	Report Schedule URI	URI, required
`report_template`	Template for the report	Object, required
`report_generation_frequency`	How often to generate a report: in addition to daily, `weekly`, `monthly`, and `quarterly` reports, you can schedule to receive the report only `once`.	String
`report_parameters`	Any specific parameters required for this report template • `executive_summary_report_params.schema.json` • `traffic_flow_report_params.schema.json` • `explorer_report_params.schema.json` • `ves_report_params.schema.json`	Object, required
`created_at`	Timestamp (rfc3339 timestamp) in UTC when this report schedule was created	String
`created_by`	The URI of the user who created this report schedule	URI
`updated_at`	Timestamp (rfc3339 timestamp) when this report schedule was last updated.",	String
`updated_by`	The URI of the user who updated this report schedule	URI

Defining Report Schedule Query

To define the query for report schedules, reference the required schemas (explained in Schemas to Define a Report).

- `executive_summary_report_params.schema.json`
- `traffic_flow_report_params.schema.json`
- `report_app_groups.schema.json`
- `custom_date_range.schema.json`
- `ves_report_params.schema.json`

Report Templates

These API's allow the Global Organization Administrator (`this_global_org_user`) to manage report templates. In each report template, they can specify type, time range, recurrence, and suitable parameters for the report type.

Functionality	HTTP	URI
Lists the collection of all available report templates for this user and organization.	`GET`	`[api_version][org_href]/report_templates`
This API is used to enable/disable a specific report type, which can be done only by the organization administrator.	`PUT`	`[api_version][org_href]/report_templates`

Properties for Report Templates

Property	Description	Parameter Type	Required
`href`	Report Template URI	String	Yes
`name`	The Display name for this report template maxLength: 255	String	Yes
`report_parameters`	Any specific parameters required for this report template to define one of the report types, using on of the listed schemas: • `executive_summary_report_params.schema.json` • `traffic_flow_report_params.schema.json` • `explorer_report_params.schema.json` • `ves_report_params.schema.json`	Object	Yes

Defining Report Templates Query

To define the query for report templates, reference the required schemas (explained in Schemas to Define a Report).

On-Demand Reports

The user authorized as the Global Organization Administrator (`this_global_org_user`) can download various kinds of reports, create them on-demand, or add the property `report_format` to determine the format in which the report will be generated.

Functionality	HTTP	URI
Returns a collection of reports.	`GET`	`[api_version][org_href]/reports`
Returns a report for the provided UUID.	`GET`	`[api_version][org_href]/reports/:report_id`
Downloads a specific report.	`GET`	`[api_version][org_href]/reports/:report_id/download`
Creates a new on-demand report.	`POST`	`[api_version][org_href]/reports`
Cancels a report if it's not yet completed/failed	`PUT`	`[api_version][org_href]/reports/:report_id`
Added a new property `report_format`, which determines the format in which the report should be generated	`POST`	`[api_version][org_href]/reports_schedules`
Added a new property `report_format` , which determines the format in which the report should be generated	`PUT`	`[api_version][org_href]/reports_schedules`

Parameters for On-Demand Reports

Parameter	Description	Parameter Type	Required
`href`		Integer	Yes
`report_template`	Template for the report	Object	Yes
`status`	Current status of this report	String	Yes
`report_parameters`	Any specific parameters required for this report template to define one of the report types using on of the listed schemas: • `executive_summary_report_params.schema.json` • `traffic_flow_report_params.schema.json` • `explorer_report_params.schema.json` • `ves_report_params.schema.json`	Object	Yes
`send_by_email`	Flag for whether to send user reports by email	Boolean	True/false
`progress_percentage`	Progress percentage for this report.	Integer	`"minimum": 0, "maximum": 100`

Report Settings

Report Settings define for how many days a report will be stored or persisted.

The user authorized as the Global Organization Administrator (`this_global_org_user`) can manage the report settings, list them or update.

Functionality	HTTP	URI
Get the report settings for an organization.	GET	[api_version][org_href]/report_settings
Updates the report settings for an organization.	PUT	[api_version][org_href]/report_settings

Schemas to Define a Report

These schemas are referenced and used to define the content of a report:

- executive_summary_report_params.schema.json

  Reports parameters for the executive summary report, such as report_time_range (Time range the report is built across) and references to report_time_range_definitions.schema.json#/definitions/custom_date_range or report_time_range_definitions.schema.json#/definitions/last_num_days.

- traffic_flow_report_params.schema.json

  Reports parameters for traffic flow query report.

- report_app_groups.schema.json

  This is the App Group Schema for reports.

- custom_date_range.schema.json

  Provides the time range the report is built across.

- common legacy_workload_modes.schema.json

  Provides the assigned labels summary with the label URI, as well as the key and value in the key-value pair.

- report_time_range_definitions.schema.json

  Provides the report parameters for the executive summary report, such as Start date for the range, End date for the range, and Last x number of days the report is built across.

- labels_summary.schema.json

  Provides the assigned labels summary with properties such as label URI, Key in key-value pair, and Value in key-value pair.
- ves_report_params.schema.json

  Provides report parameters for the new ves (vulnerability-exposure score) report type.

Examples

Report Templates

GET /orgs/:xorg_id/report_templates

List the report templates for this user and organization.

```
[
    {
```

```
        "href": "/orgs/1/report_templates/executive_summary_report",
        "name": "Executive Summary",
        "report_parameters": {}
    },
    {
        "href": "/orgs/1/report_templates/traffic_flow_report",
        "name": "Traffic Flow Query",
        "report_parameters": {
            "app_groups": []
        }
    }
]
```

This request references the following two schemas (see Schemas to Define a Report).

- `executive_summary_report_params.schema.json`
- `traffic_flow_report_params.schema.json`

Report Schedules

POST /api/v2/orgs/1/report_schedules

Request to create a new report schedule:

```
{
    "report_template": {
        "href": "/orgs/1/report_templates/traffic_flow_report"
    },
    "name": "John's Traffic Flow Report - Quarterly",
    "report_generation_frequency": "quarterly",
    "report_parameters": {
        "report_time_range": {
            "last_num_days": 90
        },
        "app_groups": [

        ]
    }
}
```

Response (201 created)

```
{
    "href": "/orgs/1/report_schedules/8a08b381-c8fe-4837-b9c6-071c70861369",
    "report_template": {
        "href": "/orgs/1/report_templates/traffic_flow_report"
    },
    "name": "John's Traffic Flow Report - Quarterly",
    "report_generation_frequency": "quarterly",
    "report_parameters": {
        "app_groups": [],
        "report_time_range": {
            "last_num_days": 90
        }
```

```
    }
}
```

On-demand Reports

POST /api/v2/orgs/1/reports

Request to create an on-demand report in the PDF format (`report_format`):

```
{
    "report_template": {
        "href": "/orgs/1/report_templates/executive_summary_report"
    },
    "description": "John's Executive Summary Report",
    "report_parameters": {
        "report_time_range": {
        "last_num_days": 30
        }
    },
    "report_format": "pdf"
}
```

Response

```
{
    "href": "/orgs/1/reports/be9b68ec-c35a-49bb-9400-f78c9950e321",
    "report_template": {
        "href": "/orgs/1/report_templates/executive_summary_report",
        "name": "Executive Summary Report"
    },
    "description": "John's Executive Summary Report",
    "created_at": "2021-01-15T05:45:27.130Z",
    "updated_at": "2021-01-15T05:45:27.130Z",
    "progress_percentage": 0,
    "generated_at": null,
    "status": "queued",
    "report_parameters": {
        "report_time_range": {
            "last_num_days": 30
        }
    },
    "created_by": {
        "href": "/users/1"
    },
    updated_by": {
        "href": "/users/1"
    }
}
```

Report Settings

GET /orgs/:xorg_id/settings/reports

Request to list report settings:

```
{
    "href": "/orgs/1/report_settings",
    "report_retention_days": 1,
    "enabled": true,
    "max_queued_reports": 25
}
```

Ransomware Protection Dashboard APIs

The Ransomware Dashboard is powered by the two main APIs: `time_series` and `risk_summary`.

For more details, see Ransomware Dashboard in Visualization Guide.

Risk SummaryAPIs

Ransomware Dashboard APIs that evaluate the risk from ransomware attacks are :

- reports_risk_summary_ransomware_timeseries_statistics_post [243]
- reports/risk_summary_get [243]
- num_protected_unprotected_ports [244]

Time Series APIs

New APIs for the Ransomware Dashboard that are dedicated to reporting about ransomware events are:

- reports_time_series_statistics_post [242]
- reports_time_series_statistics_post_response [242]

Workload APIs Changed for Ransomware

- workloads_getworkloads_get
  The object `risk_summary`
- workloads_risk_details_get
  The object `risk_details`
- workload_ransomware_services
  Reference for `workloads_risk_details_get`

Settings APIs Changed for Ransomware

- settings_get
  Property `num_assets_requiring_ransomware_protection`
- settings_put
  Property `num_assets_requiring_ransomware_protection`

Security Policy Changed for Ransomware

- sec_policy_services_post
- sec_policy_services_put

- sec_policy_services_get

These Security Policy APIs are explained in the topic Services.

List of APIs

reports_risk_summary_ransomware_timeseries_statistics_post

This API is used to show the time series data:

- Number of managed workloads
- Percent of the ransomware protection coverage
- Number of workloads by exposure

Data is presented with the granularity of `day`, `week`, `month`, and `quarter`, where the default is `day`.

reports/risk_summary_get

Security administrators use this API to view how many workloads are ransomware protection ready and then assess the degree of protection in their whole system. This schema supplies the required information to run the Ransomware Dashboard:

- Number of total workloads
- Number of protected workloads
- Number of risky ports by the severity of their risk exposure (low, medium, high, and critical)
- Workload protection by the port type (admin and legacy)
- Ransomware protection coverage percent
- Date when the status was last updated

Sample Response for reports/risk_summary_get

```
{
   "ransomware":{
    "num_total_workloads":98,
    "num_protected_workloads":22,
    "workload_protection_by_severity":{
      "low":{
        "protected_workload_count":2,
        "unprotected_workload_count":8
       },
       "medium":{
        "protected_workload_count":3,
        "unprotected_workload_count":6
       },
      "high":{
        "protected_workload_count":2,
        "unprotected_workload_count":8
       },
       "critical":{
        "protected_workload_count":3,
        "unprotected_workload_count":6
       }
            },
```

```
   "workload_protection_by_port_type":{
    "admin":{
       "protected_workload_count":2,
       "unprotected_workload_count":8
    },
    "legacy":{
       "protected_workload_count":3,
       "unprotected_workload_count":6
    }
   },
   "ransomware_protection_coverage_percent":56,
   "last_updated_at":"2023-01-21 23:32:42.679673"
   }
}
```

In release 23.5, this API was changed so that the property `risky_ports_by_category` was added to support the widget "Risky ports by type" in the UI.

```
"risky_ports_by_category": {
      "description": "Risky ports by Port type",
      "type": "object",
       "properties": {
        "admin": {
            "$ref": "num_protected_unprotected_ports.schema.json"
        },
        "legacy": {
            "$ref": "num_protected_unprotected_ports.schema.json"
        }
    }
}
```

num_protected_unprotected_ports

This schema is referenced from `reports_risk_summary_get.schema.json` to supply the number of protected and unprotected ports for a specified risk level:

```
{
   "$schema": "http://json-schema.org/draft-04/schema#",
   "type": "object",
   "required": [
    "num_protected_ports",
    "num_unprotected_ports"
  ],
   "properties": {
    "num_protected_ports": {
       "description": "Number of protected ports for this risk level,
across all protection ready workloads",
       "type": "integer"
       },
    "num_unprotected_ports": {
       "description": "Number of unprotected ports for this risk level,
across all protection ready workloads",
       "type": "integer"
    }
   }
}
```

reports_time_series_statistics_post

This schema supplies the granularity of the time series data.

The API `reports_time_series_statistics_post` includes these properties:

- `num_managed_workloads`, which is requested by the payload. The resolution might be `day`, `week`, `month`, and `quarter`, which defines what the UI will show. The default value is "day".
- `ransomware_protection_coverage_percent`: Percent of the ransomware protection coverage (added in release 23.5)
- `num_workloads_by_exposure`: Number of workloads by exposure (added in release 23.5)

Data is presented with the granularity of `day`, `week`, `month`, and `quarter`, where the default is `day`.

```
{
    "$schema": "http://json-schema.org/draft-04/schema#",
    "type": "array",
    "items": {
       "type": "object",
       "required": [
        "property"
        ],
       "properties": {
        "property": {
           "description": "The property for which time series data is
requested.",
           "type": "string",
           "enum": [
           "num_managed_workloads",
           "ransomware_protection_coverage_percent",
           "num_workloads_by_exposure"
           ]
        },
```

reports_time_series_statistics_post_response

This API specifies the time series data about the protected workloads.

Previously, the schema contained the integer count on the end date of the counted period. This item was removed:

```
"count": {
       "description": "The integer count on the end date of this period.",
       "type": "integer"
       },
    "unit": {
       "description": "The unit of the value returned.",
       "type": "string"
          },
```

Starting from release 23.5, this API gives the percentage of the end date of the counted period.

It is referencing the schema `num_workloads_by_exposure_time_series`.

```
 "data": {
   "oneOf": [
   {
    "$ref": "../../../agent/schema/v2/
num_workloads_by_exposure_time_series.schema.json"
   },
   {
    "count": {
        "description": "The integer count on the end date of this period.",
        "type": "integer"
        }
    },
    {
    "percentage": {
        "description": "The percentage on the end date of this period.",
        "type": "number",
        "minumum": 0,
        "maximum": 100
        }
    }
]
```

workloads_get

This Public Stable API was changed to support the Ransomware Dashboard in the following way:

One new object was added: `risk_summary`, which explains the risk summary for the workload. This object includes a required object `ransomware`, which supplies these properties:

- `workload_exposure_severity`
- `ransomware_protection_percent`
- `last_updated_at`

```
{
 "properties": {
   "risk_summary": {
    "description": "Risk Summary for this workload",
    "type": "object",
    "required": [
       "ransomware"
    ],
    "properties": {
       "ransomware": {
        "type": [
           "object",
           "null"
        ],
        "required": [
           "workload_exposure_severity",
           "ransomware_protection_percent",
           "last_updated_at"
        ],
```

```
        "properties": {
           "workload_exposure_severity": {
            "description": "Exposure severity of the workload",
            "type": "string"
            },
           "ransomware_protection_percent": {
            "description": "Ransomware protection percentage for this
workload",
            "type": "number"
            },
           "last_updated_at": {
            "description": "The time at which the ransomware stats are last
computed at",
            "type": "string",
            "format": "date-time"
            }
        }
    }
}
```

workloads_risk_details_get

This API, which supplies the risk details, you can see in action on the Workloads page, tab Ransomware Protection.

In addition to the organization admin, the users with access to the workload can view the ransomware protection details for that workload or how many risky ports are protected and how many risky ports are not protected.

```
{
   "$schema": "http://json-schema.org/draft-04/schema#",
   "type": "object",
   "properties": {
    "risk_details": {
    "type": "object",
    "required": [
       "ransomware"
    ],
    "ransomware": {
       "type": [
        "object",
        "null"
       ],
       "properties": {
          "details": {
        "type": "array",
        "items": {
           "$ref": "workload_ransomware_services.schema.json"
        }
       },
       "last_updated_at": {
        "description": "The time at which the protection stats were last
computed at",
        "type": "string",
        "format": "date-time"
       }
```

```
      }
}
```

Sample Response for `workloads_risk_details_get`

```
{
   "risk_details":{
    "ransomware":{
       "services":[
          {
        "href":"/api/v2/orgs/8/workloads/
23131cf5-1d70-42de-9242-39055338d0ef",
        "name":"SSH",
        "port":22,
        "protocol":17,
        "severity":"low",
        "port_status":"listening",
        "protection_state":"unprotected",
        "active_policy":"allowed",
        "draft_policy":"blocked",
        "recommendation":"add_boundary"
       },
       {
        "href":"/api/v2/orgs/8/workloads/
23131cf5-1d70-42de-9242-39055338d0ef",
        "name":"SSH",
        "port":22,
        "protocol":6,
        "severity":"high",
        "port_status":"listening",
        "protection_state":"protected",
        "active_policy":"allowed",
        "draft_policy":"blocked",
        "recommendation":"has_draft_policy_needs_provisioning"
       }
    ],
    "last_updated_at":"2023-01-21 23:32:42.679673"
    }
   }
}
```

Sample Responses for `workloads_risk_details_get` when the evaluation concludes there is no risk for the workload.

When the results are not yet computed

```
{
   "risk_details":{
    "ransomware": null
   }
}
```

The full response looks as follows:

```
[
   {
    "property":"num_managed_workloads",
    "time_series":[
       {
        "start_date":"2022-10-31",
        "end_date":"2022-11-2",
        "count":120
       },
       {
        "start_date":"2022-10-24",
        "end_date":"2022-10-30",
        "count":115
       },
       {
        "start_date":"2022-10-17",
        "end_date":"2022-10-23",
        "count":110
       },
       {
        "start_date":"2022-10-10",
        "end_date":"2022-10-16",
        "count":100
       }
    ]
   }
]
```


workload_ransomware_services

This schema is referenced from `workloads_risk_details_get` to supply the required service data:

- Service location and name
- Service Port and Protocol
- Severity and Protection state of this service
- Status of the port on the workload
- Active and Draft policy that applies to the Port


```
{
   "$schema": "http://json-schema.org/draft-04/schema#",
   "type": "object",
   "required": [
     "href",
      "port",
      "protocol",
      "severity",
      "port_status",
      "protection_state",
      "active_policy",
      "draft_policy"
    ],
   "properties": {
      "href": {
       "description": "Reference of the service",
       "type": "string"
```

```
},
  "name": {
   "description": "Name of the service",
   "type": "string"
},
"port": {
   "description": "Port Number",
   "type": "integer",
   "minimum": 0,
   "maximum": 65535
},
"proto": {
   "description": "Protocol Number",
   "type": "integer"
},
"severity": {
   "description": "Severity of this service",
   "type": "string",
   "enum": [
      "low",
      "medium",
      "high",
      "critical"
   ]
},
   "category": {
   "description": "Category of this service",
   "type": "string",
   "enum": [
      "admin",
      "legacy"
   ]
  },
"port_status": {
   "description": "Status of the port on the workload",
   "type": "string",
   "enum":
         "listening",
      "inactive"
      ]
   },
"protection_state": {
   "description": "Protection state of this service",
   "type": "string",
   "enum": [
       "unprotected",
       "protected_open",
       "protected_closed"
      ]
},
"active_policy": {
      "description": "Active Policy that applies to this port",
      "type": "string",
      "enum": [
      "allowed",
```

```
          "allowed_across_boundary",
          "blocked_by_boundary",
         "blocked_no_rule"
          ]
       },
      "draft_policy": {
          "description": "Draft Policy that applies to this port",
          "type": "string",
             "enum": [
          "allowed",
          "allowed_across_boundary",
          "blocked_by_boundary",
          "blocked_no_rule"
        ]
       },
       "recommendation": {
        "description": "Recommendation for this port based on enforcement
state, allow and deny rules and active/draft rule",
        "type": "string",
        "enum": [
           "add_boundary",
           "has_draft_policy_needs_provisioning"
        ]
        }
      }
}
```

In release 23.5, additional information about the operating systems has been added for the ransomware service: Windows and Linux.

```
{
    "properties": {
        "os_platforms": {
        "description": "Operating system for this ransomware service",
        "type": "array",
        "minItems": 1,
        "items": {
            "type": "string",
            "enum": [
            "windows",
            "linux"
        ]
        }
    }
    }
}
```

settings_get

This Public Stable API was changed to include a new property `num_assets_requiring_ransomware_protection`.

```
{
   "$schema": "http://json-schema.org/draft-04/schema#",
   "type": "object",
   "properties": {
```

```
    "href": {
       "description": "Org Setting URI",
       "type": "string",
       "format": "uri"
    },
    "num_assets_requiring_ransomware_protection": {
       "description": "number of assets that need ransomware protection for
this org",
       "type": [
         "integer",
          "null"
       ]
    },
        ====================================
```

settings_put

This Public Stable API was changed to include a new property `num_assets_requiring_ransomware_protection`, which provides a number of assets that need ransomware protection in a specific organization (1 - 9999999). Number of assets is between one and 9999999.

```
{
   "$schema": "http://json-schema.org/draft-04/schema#",
   "type": "object",
   "additionalProperties": false,
   "properties": {
      "num_assets_requiring_ransomware_protection": {
        "description": "number of assets that need ransomware protection
for this org",
        "type": "integer",
        "minimum": 1,
        "maximum": 9999999
        ==================================
```

VEN Dashboard APIs

The Dashboard uses the following API to aggregate various data from the system and help you focus on the data you are interested in:

```
POST api/v2/orgs/:xorg_id/vens/statistics
```

You can obtain summary statistics for VENs by specifying which statistics you are interested in from a set of options. The API also supports obtaining a count for a specific property value (such as a count of VENs from a particular version of product).

POST vens/statistics

Sample Request

```
{
   “property_counts”: [
    {
```

```
        "property": "version",
        "values": [
               "19.3",
               "18.3"]
        "filters": [
         {
            "filter_property": "status",
            "values": [
                       "active",
                       ""
                     ]
         },
         {
            "filter_property": "containerized",
            "values": [
                      "true"
                     ]
         }
         ]
   },
   {
      "property": "version",
       "filters": [
        {
        "filter_property": "status",
        "values": [
                   "active"]
        }
       ]
      },
      {
       "property": "health"
      }
   ]
}
```

Sample Response

```
{
    “property_counts”: [
       {
          "property": "version",
          “counts”:[
        {
           "value": "19.1",
           "count": 1
        },
        {
           "value": "18.3",
           "count": 2
        }
       ]
    },
    {
          "property": "version",
```

```
          “counts”:[
        {
           "value": "18.1",
           "count": 1
        },
        {
           "value": "18.2",
           "count": 1
        },
        {
           "value": "18.3",
           "count": 2
        },
        {
           "value": "19.1",
           "count": 2
        }
    ]
},
{
       "property": "health",
       “counts”:[
        {
           "value": "healthy",
           "count": 3
        },
        {
           "value": "warning",
           "count": 3
        },
        {
           "value": "err",
           "count": 2
        }
        ]
    }
   ]
}
```

Vulnerabilities

Vulnerabilities are defined as entries based on the possible risk of allowing traffic on a port/protocol combination, and a vulnerability instance is the existence of a vulnerability.

This Public Experimental API lists, creates, updates, and deletes vulnerabilities.

NOTE

The Illumio Core Vulnerability Maps license is required to import Qualys report data into the Illumio PCE. For information about obtaining the Illumio Core Vulnerability Maps license, contact Illumio Support. When you obtain your license, you also receive information about how to install it.

Delete the Vulnerability License

To delete the vulnerability license, use the following CURL command from your CLI environment:

```
export API_KEY=api_key_username:api_key_secret
```

```
curl -i -H "Content-Type: application/json" https://pce_fqdn:8443/api/v2/orgs/org_id/licenses/9df01357-93cf-4f33-b720-e47bba783c55 -X DELETE -u $API_KEY
```

Replace the variables, which are entered in blue bold.

Vulnerability API Methods

Functionality	HTTP	URI
Get vulnerabilities	`GET`	`[api_version][org_href]vulnerabilities`
Get an individual vulnerability	`GET`	`[api_version][org_href][vulnerabilities_href]`
Create an individual vulnerability	`POST`	`[api_version][org_href][vulnerabilities_href]`
Modify an individual vulnerability	`PUT`	`[api_version][org_href][vulnerabilities_href]`
Delete an individual vulnerability	`DELETE`	`[api_version][org_href][vulnerabilities_href]`

Get a Collection of all Vulnerabilities

This example sets the maximum number of vulnerability reports to 2. Not using this query parameter in this GET method would return all the vulnerability reports up to a maximum of 500. For more than 500 vulnerabilities, use an Asynchronous GET Collection.

Parameter	Description	Data Type
`org_id`		Integer
`max_results`	The maximum number of vulnerabilities returned by a call to `GET /vulnerabilities`. (Optional. All vulnerabilities are returned up to a maximum of 500 if not specified.)	Integer

Curl Command to Get Collection of Vulnerabilities

```
curl -i -X GET https://pce.my-company.com:8443/api/v2/orgs/7/vulnerabilities -H 'Accept: application/json' -u $KEY:$TOKEN
```

Response Body

```
[
  {
```

```
    "href": "/orgs/2/vulnerabilities/qualys-xxxxxebe7e17",
    "name": "Host Scan Time",
    "score": 37,
    "description": "{\"severity\":\"1\"}",
    "cve_ids": [],
    "created_at": "2017-12-21T19:15:48.000Z",
    "updated_at": "2017-12-21T19:17:26.000Z",
    "created_by": null,
    "updated_by": null
  },
.....................................................
]
```

Get an Individual Vulnerability

Parameters

Parameter	Description	Parameter Type
`org_id`	Organization	Integer
`reference_id`	The ID of the vulnerability to return by `GET /vulnerabilities/{reference_id}`.	String

Curl Command to Get an Individual Vulnerability

```
curl -i -X GET https://pce.my-company.com:8443/api/v2/orgs/7/
vulnerabilities/qualys-xxxxxebe7e18 -H 'Accept: application/json' -u
$KEY:$TOKEN
```

Response Body

```
{
  "href": "/orgs/2/vulnerabilities/qualys-xxxxxebe7e18",
  "name": "Host Scan Time",
  "score": 37,
  "description": "{\"severity\":\"1\"}",
  "cve_ids": [],
  "created_at": "2017-12-21T19:15:48.000Z",
  "updated_at": "2017-12-21T19:17:26.000Z",
  "created_by": null,
  "updated_by": null
}
```

Create or Update a Vulnerability

Parameters

Parameter	Description	Parameter Type	Data Type
`reference_id`	The ID of the vulnerability. The `reference_id` is the last element of the `href` property returned by a call to `GET /vulnerabilities`.	Path	String
`score`	The normalized score of the vulnerability in the range of 0 to 100 inclusive. CVSS Score can be used here with a 10x multiplier.	Body	Integer
`name`	The title/name of the vulnerability.	Body	String
`cve-ids`	The `cve_ids` for the vulnerability.	Body	[String]
`description`	An arbitrary field to store details about the vulnerability class.	Body	String

Curl Command to Create or Update Vulnerability

```
curl -i -X PUT https://pce.my-company.com:8443/api/v2/orgs/7/
vulnerabilities/qualys-xxxxxebe7e18 -H 'Content-Type: application/json'
-u $KEY:$TOKEN -d '{"score": 50, "cve_ids": ["CVE-2012-xxxx", "CVE-2017-
xxxx"], "description": "My vulnerability test."}'
```

Example Request Body

```
{
  "score": 50,
  "cve_ids": ["CVE-2012-xxxx", "CVE-2017-xxxx"],
  "description": "My vulnerability test."
}
```

Response

On success, the system displays `HTTP/1.1 204 No Content`.

Delete a Vulnerability

To delete an individual vulnerability, specify its HREF, which can be obtained from the response from `GET /vulnerabilities`.

Request Parameter

Parameter	Description	Parameter Type	Data Type
`reference_id`	The reference ID of the vulnerability. The last element of the `href` property of a vulnerability returned by a call to `GET /vulnerabilities`.	Path	String

Curl Command to Delete Vulnerability

```
curl -i -X DELETE https://pce.my-company.com:8443/api/v2/orgs/7/
vulnerabilities/qualys-xxxxxebe7e18 -u $KEY:$TOKEN
```

Vulnerability Reports

This Public Experimental API creates, updates, and deletes vulnerability reports.

NOTE

An Illumio Core Vulnerability Maps license is required to import Qualys report data into the Illumio PCE. For information about obtaining the Illumio Core Vulnerability Maps license, contact Illumio Support. When you obtain your license, you also receive information about how to install it.

Vulnerability Reports API Methods

HTTP	Functionality	URI
`GET`	Get a collection of vulnerability reports	`[api_version][org_href]/vulnerability_reports`
`GET`	Get an individual vulnerability report	`[api_version][vulnerability_reports_href]`
`POST`	Create an individual vulnerability report	`[api_version][vulnerability_reports_href]`
`PUT`	Update an individual vulnerability report	`[api_version][vulnerability_reports_href]`
`DELETE`	Delete an individual vulnerability report	`[api_version][vulnerability_reports_href]`

Get a Collection of Vulnerability Reports

This method gets a collection of all vulnerability reports in your organization.

By default, the maximum number returned by a GET collection of vulnerability reports is 500. For more than 500 vulnerability reports, use an Asynchronous GET Collection.

Curl Command to Get Collection of Vulnerability Reports

In this example, the maximum number of vulnerability reports is set to 2. Not using this query parameter in this GET method would return all the vulnerability reports up to a maximum of 500.

```
curl -i -X GET https://pce.my-company.com:8443/api/v2/orgs/7/
vulnerability_reports -H 'Accept: application/json' -u $KEY:$TOKEN
```

Query Parameter to Get a Collection of Vulnerability Reports

Parameter	Description	Parameter Type	Data Type
`max_results`	The maximum number of vulnerability reports returned by a call to `GET /vulnerability_reports`. Optional. If not specified, by default, all vulnerability reports are returned up to a maximum of 500.	Query	Integer

Response Body

```
[
  {
    "href": "/orgs/2/vulnerability_reports/qualys-report-12345",
    "report_type": "qualys",
    "name": "my-report-2017-12-21-19-15-47",
    "created_at": "2017-12-21T19:15:48.000Z",
    "updated_at": "2017-12-21T19:15:48.000Z",
    "num_vulnerabilities": 4887,
    "created_by": null,
    "updated_by": null
  },
  {
    "href": "/orgs/2/vulnerability_reports/qualys-report-12346",
    "report_type": "qualys",
    "name": "my-report-2017-12-21-19-17-15",
    "created_at": "2017-12-21T19:17:15.000Z",
    "updated_at": "2017-12-21T19:17:15.000Z",
    "num_vulnerabilities": 1776,
    "created_by": null,
    "updated_by": null
  }
]
```

Get a Vulnerability Report

Curl Command to Get Vulnerability Report

```
curl -i -X GET https://pce.my-company.com:8443/api/v2/orgs/7/
vulnerability_reports/qualys-report-123456 -H 'Accept: application/json' -u
$KEY:$TOKEN
```

Request Parameter to Get an Individual Vulnerability Report

The following required path parameter restricts the results of the GET command to the specified vulnerability report.

Parameter	Description	Parameter Type	Data Type
`reference_id`	The ID of the vulnerability report (this is the last element in the vulnerability report HREF returned by a call to `GET /vulnerability_reports`).	Path	String

Response Body

```
{
  "href": "/orgs/2/vulnerability_reports/qualys-report-123456",
  "report_type": "qualys",
  "name": "my-report-2017-12-21-19-17-15",
  "created_at": "2017-12-21T19:17:15.000Z",
  "updated_at": "2017-12-21T19:17:15.000Z",
  "num_vulnerabilities": 1776,
  "created_by": null,
  "updated_by": null
}
```

Create or Update a Vulnerability Report

Curl Command to Update a Vulnerability Report

```
curl -i -X PUT https://pce.my-company.com:8443/api/v2/orgs/7/
vulnerability_reports/qualys-report-123456 -H 'Content-Type: application/
json' -u $KEY:$TOKEN -d '{"name": "My vulnerability report", "report_type":
"qualys"}'
```

Response Properties

Property	Description	Data Type
`name`	User generated the name of the vulnerability report.	Integer
`report_type`	A string representing the type of the report.	String
`authoritative`	Boolean value specifies whether a report is authoritative or not.	[String]
`scanned_ips`	The ips on which the scan was performed.	String
	Enforced 100K maxitem limit.	
`detected_vulnerabilities`	An array of parameters, of which `ip_address`, `workload`,	
	Enforced 100K maxitem limit.	
	`ip_address`: (Required) The IP address of the host where the vulnerability is found (string)	
	`port`: The port associated with the vulnerability (integer)	
	`proto`: The protocol that is associated with the vulnerability (integer)	
	`workload`: (Required) The URI of the workload associated with this vulnerability (string)	
	`vulnerability`: (Required) The URI of the vulnerability class associated with this vulnerability (string)	
`external_data_reference`	(`PUT` only) This parameter supports third-party reference data	
`state`	(`PUT` only) Enables deletion, addition, or updating of vulnerabilities	
`exported_at`	(`PUT` only) Saves the timestamp for the next delta pull.	

Example Request Body

```
{
  "name":"My vulnerability report",
  "report_type": "qualys",
  "authoritative": true
}
```

Response

On success, the system displays `HTTP/1.1 204 No Content`.

Delete a Vulnerability Report

To delete an individual vulnerability report, specify the last element of its HREF, which can be obtained from the response from `GET /vulnerabilities`.

Curl Command to Delete Vulnerability Report

```
curl -i -X DELETE https://pce.my-company.com:8443/api/v2/orgs/7/
vulnerability_reports/qualys-report-2017-12-21-19-17-15 -u $KEY:$TOKEN
```

Request Parameter

Parameter	Description	Parameter Type	Data Type
`reference_id`	The ID of the vulnerability report (this is the last element in the vulnerability report HREF returned by a call to `GET /vulnerability_reports`).	Path	String

Workloads APIs

The Workloads APIs allow you to get information about workloads and network interfaces and to identify unauthorized traffic to or from workloads. Use the Workloads APIs to perform workload-related operations, such as pair workloads, configure pairing profiles, and obtain pairing keys.

Configure pairing profiles to apply properties to workloads as they pair with the PCE, such as what labels to apply. Configuring a pairing profile gives you a unique pairing key that identifies the VEN. Pair workloads to install VENs on them. The VEN reports detailed workload information to the PCE, such as which services run on the workload.

Workload Operations

This Public Stable API allows you to perform workload operations, such as create an unmanaged workload, update workload information, unpair a workload, and delete a workload.

Workload Methods

Functionality	HTTP	URI
Get a collection of all workloads.	`GET`	`[api_version][org_href]/workloads`
Get a specified workload.	`GET`	`api_version][org_href]/workloads/workload_id`
Create an unmanaged workload.	`POST`	`[api_version][org_href]/workloads`
Update a workload or mark as suspended.	`PUT`	`[api_version]/workloads/workload_id`

Query Parameters

Parameter	Description	Type	Required
`org_id`	Organization	Integer	Yes
`agent.active_pce_fqdn`	FQDN of the PCE	String	No
`container_clusters`	List of container cluster URIs, encoded as a JSON string	String	No
`enforcement_mode`	Enforcement mode of workload(s) to return.	String	No
`external_data_set`	The data source from which a resource originates		
`external_data_reference`	A unique identifier within the external data source	String	No
`hostname`	The hostname of workload(s) to return. Supports partial matches	String	No
`include_deleted`	Include deleted workloads	Boolean	No
`ip_address`	IP address of workload(s) to return. Supports partial matches	String	No
`labels`	List of lists of label URIs, encoded as a JSON string. From release 22.3.0, this API is not referencing `labels.schema.json` and it lists labels associated with this workload. Required properties are: `href`, `key`, and `value`.	String	No
`last_heartbeat_on[gte]`	Greater than or equal to the value for the last heartbeat on the timestamp	Integer	No
`last_heartbeat_on[lte]`	Less than or equal to the value for the last heartbeat on the timestamp	Integer	No
`log_traffic`	Whether we want to log traffic events from this workload	Boolean	No
`managed`	Return managed or unmanaged workloads using this filter. `True` if the workload is managed, else `false`	Boolean	No
`max_results`	Maximum number of workloads to return.	Integer	No
`mode`	Management mode of workload(s) to return. DEPRECATED AND REPLACED (Use enforcement_mode)	String	No
`name`	Name of workload(s) to return. Supports partial matches	String	No
`online`	Return online/offline workloads using this filter	Boolean	No
`os_id`	Operating System of workload(s) to return. Supports partial matches	String	No
`policy_health`	Policy of health of workload(s) to return. Valid values: active, warning, error, suspended	String	No

Parameter	Description	Type	Required
`security_policy_sync_state`	Advanced search option for workload based on policy sync state	String	No
`security_policy_update_mode`	Advanced search option for workload based on security policy update mode	String	No
`soft_deleted`	DEPRECATED WITH NO REPLACEMENT: Only soft-deleted workloads	Boolean	No
`ven`	URI of the VEN to filter by. From release 22.3.0, in addition to providing the VENs HREF, it is required to give its `hostname`, `name`, `ven_type`, and `status`. The VEN properties are now clearly displayed, without a need to use expanded representations. The `ven_type` property is introduced through the reference to a common schema `ven_type.schema.json`: `{ "properties": { "ven_type": { "$ref": "../common/ven_type.schema.json" }}`	String	No
`visibility_level`	Filter by visibility level		No
`vulnerability_summary.vulnerability_exposure_score[gte]`	Greater than or equal to the value for `vulnerability_exposure_score`	Integer	No
`vulnerability_summary.vulnerability_exposure_score[lte]`	Less than or equal to the value for `vulnerability_exposure_score`	Integer	No

Properties for GET

Property	Description	Type	Required
`created_at`	The time (rfc3339 timestamp) at which this workload was created	String date/time	Yes
`data_center`	The name of the data center where the workload is being hosted.		
`data_center_zone`	The zone inside the data center hosting the workload.	String	No
`deleted_at`	This workload has been deleted.	date/time	
`deleted_by`	HREF	String	
`labels`	Labels that are attached to the workload: `href`, `key`, and `value`	Array.	No
`name`	Short, friendly name of the workload.	String	Yes
`os_detail`	Additional descriptive information about the workload OS	String	No
`os_id`	Unique OS identifier given by Illumio to the workload.	String	No
`online`	Indicates whether the workload is online and can communicate with the PCE.	Boolean.	No
`public_ip`	The public IP address of the workload.	String Null	No
`services`	This field contains the following data: • `uptime_seconds` • `created_at` • `open_service_ports`: with the following data: `protocol`, `address`, `port`, `process_name`, `user`, `package`, `win_service_name`		
`service_provider`	Name of the service provider that is hosting the workload.	String	No
`updated_at`	The time (rfc3339 timestamp) at which this workload was last updated	String date/time	Yes
`vulnerabilities_summary`	Reference to `common/vulnerability_summary.schema.json`		
`detected_vulnerabilities`	Reference to `common/workloads_detected_vulnerabilities.schema.json`		
`agent`	DEPRECATED AND REPLACED (USE 'ven' INSTEAD). Information about the agent that manages this workload.		
`ven`	This section of the response returns the following data: • `href` • `hostname` • `name`		

Property	Description	Type	Required
	• `status`		
`container_cluster`	Reference to `common/compact_container_cluster.schema.json`		
`ike_authentication_certificate`	IKE authentication certificate for certificate-based Secure Connect and Machine Auth connections		

Vulnerability Computation State

The new field `vulnerability_computation_state` is added to `vulnerability_summary` for all APIs that return the namespace. It defines three computation states:

- `not_applicable` (N/A) indicates that the vulnerability exposure score cannot be calculated and happens in the following cases:
  - Unmanaged workloads
  - Idle workloads
  - Vulnerabilities that have no port associated with them.
- `syncing`: For managed workloads, when the vulnerability exposure score hasn't been calculated yet and the value is not available.
- `in_sync`: For managed workloads, when the workload with the VES value is calculated and available.

The following APIs have been updated to return `vulnerability_computation_state`:

- `workloads`(get collection) API
- `workloads/detailed_vulnerability`
- `workloads` (get instance)
- `workloads/:uuid/detected_vulnerabilities`
- `aggregated_detected_vulnerabilities`

Example of Computation States:

syncing: Workload is in the syncing state (VES is calculable but hasn't been calculated yet):

```
"vulnerability_summary": {
    "num_vulnerabilities": 30,
    "max_vulnerability_score": 88,
    "vulnerability_score": 1248,
    "vulnerable_port_exposure": null,
    "vulnerable_port_wide_exposure": {
        "any": null,
        "ip_list": null
    },
    "vulnerability_exposure_score": null,
    "vulnerability_computation_state": "syncing"
},
```

Vulnerability Exposure Score (VES) Filters

The workloads GET collection API includes query parameters to filter returned workloads based on their Vulnerability Exposure Score.

These vulnerability filters are considered experimental and might be changed in the future.

Specify these parameters to get all the workloads that have a specific score.

NOTE

To use these new query parameters, you must include the query parameter `representation=workload_labels_vulnerabilities`; otherwise, the PCE won't perform any vulnerability calculations.

Some examples of using the filters are:

```
GET api/v2/orgs/:xorg_id/workloads?
representation=workload_labels_vulnerabilities&vulnerability_summary.vulnera
bility_exposure_score%5Blte%5D=50
```

```
GET api/v2/orgs/:xorg_id/workloads?
representation=workload_labels_vulnerabilities&vulnerability_summary.vulnera
bility_exposure_score%5Bgte%5D=50&vulnerability_summary.vulnerability_exposu
re_score%5Blte%5D=999
```

Update Workload Information

This API allows you to update information about a workload. To make this call, you need the URI of the workload you want to update, which is returned in the form of an HREF path when you get either a single or a collection of workloads in an organization.

URI to Update an Individual Workload's Information

```
PUT [api_version][workload_href]
```

Example Payload

This example shows what the JSON payload looks like for changing the policy state (called `mode` in the API) of a workload from its current state to enforced.

```
{"agent":{"config":{"mode":"enforced","log_traffic":true}}}
```

Curl Command to Update a Workload

This example assumes that you want to update the state of a single workload in an organization. You can obtain an organization ID when you use the Users API to log in a user to Illumio.

```
curl -i -X PUT https://pce.my-company.com/api/v2/orgs/3/workloads/
043902c883d133fa -H "Content-Type:application/json" -u $KEY:$TOKEN -d
'{"agent":{"config":{"mode":"enforced","log_traffic":true}}}'
```

Mark Workload as Suspended

You can use this API to mark a workload VEN as suspended or unsuspended.

URI to Mark a Workload VEN as Suspended or Unsuspended

```
PUT [api_version][workload_href]
```

Example Payload

This example shows what the JSON payload looks like for marking a workload VEN as suspended, with the status property for the `agent` (the VEN) set to `suspended`.

To mark a workload VEN as unsuspended, use the same JSON body but replace `suspend` with `unsuspend`.

```
{
  "agent": {
    "status": {
      "status": "suspended"
    }
  }
}
```

Curl Command to Mark Workload as Suspended

This example shows how to use curl to mark a workload VEN as suspended.

This example assumes you want to mark a single workload VEN as suspended. You can obtain an organization ID when you use the Users API to log in a user to Illumio.

```
curl -i -X PUT https://pce.my-company.com/api/v2/orgs/3/workloads/
043902c883d133 -H "Content-Type:application/json" -u $KEY:$TOKEN -d
'{"agent":{"status":{"status":"suspended"}}}'
```

Create an Unmanaged Workload

The Unmanaged Workload API enables you to create a workload without installing the VEN on it. This API is commonly used if you are using Kerberos authentication between the VEN and the PCE.

URI to Create an Unmanaged Workload

```
POST [api_version][org_href]/workloads
```

Example Payload

For example, to create an unmanaged workload by providing a name, hostname, public IP address, and its Kerberos Service Principal Name, construct the JSON payload as follows:

```
{
     "name":"web_tier1",
     "hostname":"web_workload1.example.com",
     "public_ip":"10.10.10.10",
     "service_principal_name":"my_company-device-auth/
```

```
web_workload1.example.com",
}
```

Curl Command to Create an Unmanaged Workload

```
curl -i -X POST https://pce.my-company.com:8443/api/v2/orgs/4/
workloads -H "Content-Type: application/json" -u $KEY:$TOKEN -d
'{"name":"web_tier1", "hostname":"web_workload1.example.com","public_ip":
"10.10.10.10","service_principal_name":"my_company-device-auth/
web_workload1.example.com"}'
```

Delete a Workload Record

If you have unpaired a workload, you can use this API to delete the workload's record from the PCE.

URI to Delete a Workload Record

```
DELETE [api_version][workload_href]
```

Unpair Workloads

This API allows you to unpair workloads from the PCE by uninstalling the Illumio VEN from each workload. You can unpair up to 1,000 workloads at a time.

Pairing a workload installs the Illumio VEN on a workload. Unpairing a workload uninstalls the VEN from the workload so that the workload no longer reports any information to the PCE and can no longer receive any policy information.

When you unpair workloads with this API, you can set the state for the workload's iptables (Linux) or WFP (Windows) configuration.

URI to Unpair a Workload

```
PUT [api_version][org_href]/workloads/unpair
```

IMPORTANT

The endpoint `workloads/unpair` is DEPRECATED. Use /vens/unpair instead.

See Curl Commands for Unpairing and Suspending VEN [304]s for more details.

Request Parameters

Parameter	Description	Type	Required
`org_id`	Organization	Integer	Yes
`workloads`	Defines the list of workloads you want to unpair. You must specify at least one workload to unpair by defining the workload HREF. You can define up to 1,000 workloads to unpair with this API. Required property: `href`:URI of the workload to unpair.	Array	Yes
`ip_table_restore`	**IMPORTANT** Use `/vens/unpair` and the parameter `firewall_restore` instead. This property allows you to determine the state of the workload iptables (Linux) or WFP (Windows) configuration after the workload is unpaired. Options include: • `saved`: Revert the iptables on the workload to the configuration before the VEN was installed. However, VEN removal could adversely impact security depending on how old the iptables or WFP configuration was on the workload. • `default`: Apply the recommended policy to uninstall the VEN and allow only port 22 SSH connections to the workload. It is safest from a security viewpoint, but if this workload runs a production application, it could break because it will no longer allow any connections to it. • `disable`: Uninstall the VEN and leave all port connections on the workload open. This is the least safe from a security viewpoint. If iptables WFP configuration or Illumio were the only security being used for this workload, the workload would be opened up to anyone and become vulnerable to attack.	String	Yes

Example Payload for Unpairing Workloads

```
{
    "workloads": [
      {"href":"/orgs/7/workloads/XXXXXXXx-9611-44aa-ae06-fXXX8903db65"},
      {"href":"/orgs/7/workloads/xxxxxxxx-9611-xxxx-ae06-f7bXXX03db71"}
    ],
    "firewall_restore":"saved"
 }
```

Curl Command for Unpairing Workload

```
curl -i -X PUT https://pce.my-company.com/api/v2/orgs/3/workloads/unpair -H
"Content-Type:application/json" -u $KEY:$TOKEN -d '{"workloads": [{"href":
"/orgs/7/workloads/xxxxxxxx-9611-44aa-ae06-fXXX8903db65", "href": "/orgs/7/
workloads/xxxxxxxx-9611-xxxx-ae06-f7bXXX03db71"}], "firewall_restore":
"default"}'
```

Workloads Going Offline

Three new properties are now available to describe `LOG_INFO` level notification, `LOG_WARNING` level notification, and `LOG_ERR` level notification for workloads going offline.

When a VEN does not contact the PCE within a set time interval, it is marked as being offline. Previously, before that happened, a notification was created when the VEN was AWOL (missing) for 25% of the offline time.

These three new optional settings generate different levels of notifications at different intervals so the user can customize the timing and levels of notification.

They are described in the schema `resource_canonical_representations`:

Properties for Workload Disconnection

Property	Description	Type
`workload_disconnected_timeout_second`	Disconnected timeout in seconds	Integer
`workload_goodbye_timeout_seconds`	Goodbye timeout in seconds	Integer
`workload_disconnect_notification_info`	Threshold in seconds for `LOG_INFO` level notification of a workload going offline	Integer
`workload_disconnect_notification_warning`	Threshold in seconds for `LOG_WARNING` level notification of a workload going offline	Integer
`workload_disconnect_notification_error`	Threshold in seconds for `LOG_ERR` level notification of a workload going offline	Integer

Workload Settings

This Public Stable API allows you to get network interface information from a workload, for either all interfaces on a workload or an individual interface. You can also configure (create) or delete an individual network interface configuration.

Workload Settings Methods

Functionality	HTTP	URI
Get agent timeout notifications	`GET`	`[api_version][org_href]/settings/workloads`
Update agent timeout notifications	`PUT`	`[api_version][org_href]/settings/workloads`

Endpoint Offline Timer

The Endpoint Offline Timer was introduced to overcome the 24-hour limitation that was hard-coded for endpoints heart beating.

If the endpoints did not heartbeat for 24 hours, they were marked as being offline and the endpoint timer was hard coded to 24 hours. However, the 24-hour limit was found to be limiting, so it was adjusted to allow for endpoint mobility and usability.

The existing two APIs have been changed:

- `GET /api/v2/orgs/:xorg_id/settings/workloads`: Added properties to reflect the endpoint timeout values: disconnect.
- `PUT /api/v2/orgs/:xorg_id/settings/workloads`: Updated the endpoint offline, heartbeat, and disconnect and quarantine warning timeout values.

The three workload timeout setting fields have been updated:

Workload Timeout Setting Fields

Field	Description	Required
`workload_disconnected_timeout_seconds`	Timer setting triggered if the server or endpoint has not heart beaten to the PCE. Referencing the schema `settings_workload_detailed.schema.json`	Yes
`workload_goodbye_timeout_seconds`	Timer setting triggered if the server or endpoint operation is performed (stop, disable, ...). Referencing the schema `settings_workload_detailed.schema.json`	Yes
`workload_disconnected_notification_seconds`	Time period to wait with no heartbeat before a warning is emitted. Referencing the schema `settings_workload_notifications.schema.json`	Yes
`ven_uninstall_timeout_hours`	Defines the period (in hours) to wait before uninstalling a VEN. Referencing the schema `settings_workload.schema.json`	Yes

Schemas that Support the Endpoint Offline Timer

settings_workload_notifications

This schema file was updated and now has an additional property `ven_type` to support the ven type by the referenced timeout fields.

```
{
    "$schema": "http://json-schema.org/draft-04/schema#",
    "type": "array",
    "items": {
        "type": "object",
        "additionalPropertes": false,
        "required": [
            "scope",
            "warning"
        ],
```

```
        "properties": {
            "scope": {
            "$ref": "labels.schema.json"
        },
        "warning": {
        "description": "Workload disconnect warning timeout",
        "type": "integer",
            "minimum": -1,
            "maximum": 2147483647
        },
        "ven_type": {
        "description": "The ven type that this property is applicable to",
        "type": [
            "string",
            "null"
        ],"enum": [
            "server",
            "endpoint"
        ]
       }
    }
   },
    "uniqueitems": true
}
```

settings_workload_detailed

The new schema `settings_workload_detailed` is expanded from the previous schema `settings_workload` so that additional information about the `ven_type` was added.

```
{
    "$schema": "http://json-schema.org/draft-04/schema#",
    "type": "array",
    "items": {
        "type": "object",
        "additionalProperties": false,
        "required": [
            "scope",
            "value"
        ],
        "properties": {
            "scope": {
            "$ref": "labels.schema.json"
        },
        "value": {
        "description": "Property value associated with the scope",
        "type": "integer",
            "minimum": -1,
            "maximum": 2147483647
        },
        "ven_type": {
        "description": "The ven type that this property is applicable to",
        "type": [
            "string",
            "null"
            ],
```

```
        "enum": [
            "server",
            "endpoint",
            null
        ]
          }
     }
   },
  "uniqueItems": true
}
```

To ensure backend compatibility, the new field ven_typeis specified as optional. If it is missing in the request, the parameter is considered as being of a server type.

Examples

The example below represents the complete JSON string returned by the `GET /api/v2/orgs/:xorg_id/settings/workloads` request:

```
{
    "href": "/orgs/1/settings/workloads",
    "workload_disconnected_timeout_seconds": [
    {
        "scope": [],
        "value": 10800,
        "ven_type": "server"
    },
    {
        "scope": [],
        "value": 3600,
        "ven_type": "endpoint"
    },
    ],
    "workload_goodbye_timeout_seconds": [
    {
        "scope": [],
        "value": 12000,
        "ven_type": "server"
    },
    {
        "scope": [],
        "value": 7200,
        "ven_type": "endpoint"
    }
    ],
    "workload_disconnected_notification_seconds": [
    {
    {
        "scope": [],
        "info": 1800,
        "warning": 3600,
        "error": 5400,
        "ven_type": "server
    },
    {
```

```
        "scope": [],
        "info": 1801,
        "warning": 3602,
        "error": 5403,
        "ven_type": "server
    }
    }
    ],
    "ven_uninstall_timeout_hours": [
    {
        "scope": [],
        "value"=>300
        }
    ]
}
```

The following example shows how to set all four workload timeout setting properties via the `PUT /api/v2/orgs/:xorg_id/settings/workloads` request:

```
{
    "workload_disconnected_timeout_seconds": [
    {
        "scope": [],
        "value": 10800,
        "ven_type": "server"
    },
    {
        "scope": [],
        "value": 3600,
        "ven_type": "endpoint"
    },
    ],
    "workload_goodbye_timeout_seconds": [
    {
        "scope": [],
        "value": 12000,
        "ven_type": "server"
    },
    {
        "scope": [],
        "value": 7200,
        "ven_type": "endpoint"
    }
    ],
    "workload_disconnected_notification_seconds": [
    {
    {
        "scope": [],
        "info": 1800,
        "warning": 3600,
        "error": 5400,
        "ven_type": "server"
    },
    {
        "scope": [],
```

```
        "info": 1801,
        "warning": 3602,
        "error": 5403,
        "ven_type": "endpoint"
            }
         }
    ],
    "ven_uninstall_timeout_hours": [
    {
        "scope": [],
        "value"=>300
        }
    ]
}
```

Workload Interfaces

This Public Stable API allows you to get network interface information from a workload, either for all interfaces on a workload or an individual interface. You can also configure (create) or delete an individual network interface configuration.

API Methods

Functionality	HTTP	URI
Request the list of the workload_interfaces (outside of the workloads or VEs scope). The `href` property in the API response is deprecated.	`GET`	`[api_version][workload_href]/interfaces`
Get an instance for the workload interface with the name. (DEPRECATED)	`GET`	`[api_version][workload_href]/interfaces/:name`
Directly creates a workload interface. The request payload was not changed, however the `href` field in the API response is deprecated.	`POST`	`[api_version][workload_href]/interfaces`
Delete the workload interface with the name.(DEPRECATED)	`DELETE`	`[api_version][workload_href]/interfaces/:name`
Set the network manually, update the automatic network detection. (DEPRECATED)	`PUT`	`[api_version][workload_href]/interfaces/:name/network`

Get Workload Network Interface

This API allows you to get information about one or all of the interfaces on a workload. You can retrieve workload interface information such as its connectivity (up, down, unknown), interface IP address, number of bits in the subnet, the IP address of the default gateway, and the associated network.

URI to Get a Collection of a Workload's Network Interfaces

```
GET [api_version][workload_href]/interfaces
```

Properties for GET

Property	Description	Type	Required
`name`	Interface name.	String	Yes
`address`	The IP address assigned to the interface.	String	Yes
`cidr_block`	The number of bits in the subnet (for example, /24 is 255.255.255.0).	Integer, Null	Yes
`default_gateway_address`	The default IP address of the default gateway.	String, Null	Yes
`link_state`	State of the interface connection, which is one of three values: • `up`: Interface is communicating. • `down`: Interface is not communicating. • `unknown`: State of the interface is unknown.	String, Null	Yes
`network_detection_mode`	Network Detection Mode	String, Null	Yes
`friendly_name`	User-friendly name given to the interface.	String, Null	Yes
`network`	Network that the interface belongs to	Object, Null	Yes
`href`	DEPRECATED WITH NO REPLACEMENT	String	No

Create Workload Network Interface

Directly creates a workload interface. The request payload was not changed, however the `href` field in the API response is deprecated.

URI to Create a Workload Network Interface Configuration

```
POST [api_version][workload_href]/interfaces
```

Properties for POST

Properties	Description	Type	Required
`name`	The short friendly name of the workload	String	Yes
`link_state`	State of the interface connection, which is one of three values: • `up`: Interface is communicating. • `down`: Interface is not communicating. • `unknown`: State of the interface is unknown.	String	Yes
`address`	The IP address assigned to the interface. Reference to common schema `ip_address_format_validation.schema.json`	String	No
`cidr_block`	The number of bits in the subnet (for example, /24 is 255.255.255.0).	Integer	No
`default_gateway_address`	The default IP address of the default gateway. Reference to common schema `ip_address_format_validation.schema.json`	String	No
`friendly_name`	A user-friendly name is given to the interface.	String	No
`href`	DEPRECATED WITH NO REPLACEMENT	String	No

Request Body

```
{
   "name": "eth0.public",
   "address": "192.0.2.0",
   "cidr_block": 32,
   "default_gateway_address": 255.255.255.0,
   "link_state": "up",
}
```

Curl Command Create Network Interface

```
curl -i -X POST https://pce.my-company.com:8443/api/v2/orgs/2/workloads/
xxxxxxxx-c4e9-44e7-8a31-e86acf6b276c/interfaces -H "Content-Type:
application/json" -u $KEY:$TOKEN -d '{"name": "eth0.public", "address":
"192.0.2.0","cidr_block": "32", "default_gateway_address": "255.255.255.0",
"link_state": "up"}'
```

Examples

Request for all workload interfaces with a specific name

Request: `GET /api/v2/orgs/:org_id/workloads/:workload_id/interfaces?name=eth0.public`

The response includes the deprecated href field in the response:

```
[
   {
    "href": "/orgs/1/workloads/561bd65e-136c-4005-8aa2-bdc8af1b3600/
interfaces/eth0.public"
    "name": "eth0.public",
    "cidr_block": null,
    link_state": null,
    "network_detection_mode": null,
    "friendly_name": null,
    "network": {
        "href": "/orgs/1/networks/366ff4c1-ec60-49be-a05f-3a5ccab09c2f"
    },
    "loopback": false,
    "address": "1.1.1.1",
    "default_gateway_address": null
   },
   {
    "href": "/orgs/1/workloads/561bd65e-136c-4005-8aa2-bdc8af1b3600/
interfaces/eth0.public"
    "name": "eth0.public",
    "cidr_block": null,
    "link_state": null,
    "network_detection_mode": null,
    "friendly_name": null,
    "network": {
        "href": "/orgs/1/networks/366ff4c1-ec60-49be-a05f-3a5ccab09c2f"
    },
    "loopback": false,
    "address": "2.2.2.2",
    "default_gateway_address": null
}
```

API request/response creating a new workload interface

Request: `POST /api/v2/orgs/:org_id/workloads/:workload_id/interfaces`

```
{
    "name": "eth1.private",
    "cidr_block": 32,
    "link_state": "up",
    "address": "99.99.99.7"
}
```

Response body (with the `href` deprecated):

```
{
    "href": "/orgs/1/workloads/561bd65e-136c-4005-8aa2/interfaces/
eth1.private"
    "name": "eth1.private",
    "cidr_block": 32,
    "link_state": "up",
    "network_detection_mode": "single_private_brn",
```

```
    "friendly_name": null,
    "network": {
        "href": "/orgs/1/networks/5b25c11d-4e95-42d3-abd2-488506e48b02"
    },
    "loopback": false,
    "address": "99.99.99.7",
    "default_gateway_address": null
}
```

API request deleting multiple workload interfaces (bundle delete)

Request: `PUT /api/v2/orgs/:org_id/workloads/:workload_id/interfaces/delete`

Successful delete

Payload - all interfaces with the name `eth0.public` and only one interface with the name `eth1.private` are deleted.

Response code - 200

```
{
    "name": "eth0.public"
},
{
    "name": "eth1.private",
    "address": "10.10.10.1"
}
```

Workload Bulk Operations

This Public Stable API supports “bulk” operations on collections of workloads. These operations create, update, or delete a collection of workloads using a single API call, instead of requiring separate API calls on individual workloads one at a time.

IMPORTANT

Any tooling that parses the HTTP headers should be changed to allow case-insensitive header name matching in order to retain compatibility with future PCE releases. Refer to RFC 7230, section 3.2, "Header Fields," which states that field names should be case insensitive.

About Bulk Operations

When you use a bulk operations API to create a collection of workloads, the workload record is created in the PCE in the “unmanaged” state, which means that a VEN has not been installed on the workload, and no policy can be applied to the workload. To apply a policy to unmanaged workloads, you can do one of the following:

- Pair the workloads using the pairing script located in the PCE web console.
- Install and activate the VEN on the workload using the VEN control interface.

When you use this API to *update* a collection of workloads, those workloads can be **managed** or **unmanaged**.

When you use this API to *delete* a collection of workloads, those workloads can only be **unmanaged**.

Workload Bulk Operations Methods

Functionality	HTTP	URI
Create a collection of workloads	`PUT`	`[api_version][org_href]/workloads/bulk_create`
Update a collection of workloads	`PUT`	`[api_version][org_href]/workloads/bulk_update`
Delete a collection of workloads	`PUT`	`[api_version][org_href]/workloads/bulk_delete`

Caveats for Workload Bulk Operations

NOTE

Bulk operations are rate limited to 1,000 items per operation.

Bulk operations are rate-limited to 1,000 items per operation. When you create, update, or delete a collection of workloads (also called "bulk" operations), you can only execute one such operation at a time. This means you must wait for the first bulk operation to finish before executing a new one. If you execute a new bulk operation before the currently running operation has been completed, the second operation will fail with an `HTTP 429` error.

Additionally, when you perform a bulk workload operation, any policy changes caused by the operation are applied to the affected VENs after the next VEN heartbeat to the PCE.

After a bulk operation completes, *all* of your PCE VEN connectivity states show as `Syncing` until the next VEN heartbeat. Only affected VENs receive a policy update. VENs unaffected by policy changes transition from `Syncing` to `In Sync` after the VENs heartbeat. This process can take up to 5 minutes.

External Data Reference IDs for Workloads

External data references can add your own internal identifiers to new workloads independent of Illumio PCE-created workload HREFs. You can add these entities when you create a collection of workloads using the `bulk_create` method or create an individual workload using the public API.

External data references are useful if you want to keep a set of PCE resources in sync with your internal representation of the resources, such as a configuration management database

(CMDB) that holds the “source of truth” for your workloads. Once workloads are created with these identifiers added to their properties, you can run an asynchronous query to get all workloads through an offline job, which includes the external data references in the response.

The schema for creating and updating External data references includes two properties:

- `external_data_set`: Identifies the original data source of the resource.
- `external_data_reference`: A unique identifier within that data source.

These properties are UTF-8 strings with a maximum length of 255 characters each. The contents must form a unique composite key, meaning that both values of these properties are treated as a unique key. Together, these two properties are recognized as unique keys, even if one of them is left blank or set to zero.

Create a Collection of Workloads

URI to Create a Collection of Workloads

```
PUT [api_version][org_href]/workloads/bulk_create
```

Request Body

When creating a collection of workloads, you must pass a JSON object request body that describes the workload details.

This example illustrates the request body for a single managed workload; you can add as many workloads as you want.

For example:

```
{
  "name": "workload 0",
  "description": "workload desc 0",
  "service_principal_name": "spn 0",
  "hostname": "workload-0.example.com",
  "public_ip": "24.1.1.1",
  "external_data_set": "cmdb",
  "external_data_reference": "0",
  "interfaces": [
    {
      "name": "eth0",
      "link_state": "up",
      "address": "10.0.0.2",
      "cidr_block": 24,
      "ip_version": 4,
      "default_gateway_address": "10.0.0.1",
      "friendly_name": "wan"
    }
  ],
  "labels": [
    {
```

```
        "href": "/orgs/2/labels/1"
      },
      {
        "href": "/orgs/2/labels/9"
      }
    ],
    "service_provider": "service provider",
    "data_center": "central data center",
    "os_id": "os id 0",
    "os_detail": "os detail 0",
    "online": true,
    "agent": {
      "config": {
        "enforcement_mode": "full",
        "visibility_level": "flow_summary"
      }
    }
  }
```

Curl Command to Use Bulk Create

This curl example illustrates how to create two workloads using the `bulk_create` API.

```
curl -i -X PUT https://pce.my-company.com:8443/api/v2/orgs/2/workloads/
bulk_create -H "Content-Type:application/json" -u $KEY:$TOKEN -d
'[{"name":"web_app1","description":"workload desc
0","service_principal_name":"spn 0",
"hostname":"workload-0.example.com","public_ip":"24.1.0.1","external_data_se
t":"cmdb", "external_data_reference":"0","interfaces":
[{"name":"eth0","link_state":"up","address":"10.0.0.2",
"cidr_block":24,"ip_version":4,"default_gateway_address":"10.0.0.1","friendl
y_name":"wan"}], "labels":[{"href":"/orgs/2/labels/1"},{"href":"/orgs/2/
labels/9"}],"service_provider": "service provider","data_center":"central
data center","os_id":"os id 0","os_detail":"os detail 0",
"online":true,"agent":{"config":{"enforcement_mode":"visibility_only",
"visibility_level":"flow_summary"}}}]
```

Update Collection of Workloads

This method allows you to update information about a collection of workloads. To update workload information, construct the JSON object for each workload exactly as you would for modifying one workload, but modify the properties as needed.

URI to Update a Collection of Workloads

```
PUT [api_version][org_href]/workloads/bulk_update
```

Curl Command to Bulk Update Workloads

This example shows how to update two workloads with the Bulk Update API.

```
curl -i -X PUT https://pce.my-company.com:8443/api/v2/orgs/2/workloads/
bulk_update -H "Content-Type:application/json" -u $KEY:$TOKEN -d
```

```
'[{"name":"web_app1","description":"workload desc
0","service_principal_name":”spn
0","hostname":"workload-0.example.com","public_ip":"24.1.2.1","external_data
_set":"cmdb","external_data_reference":"0",”interfaces":
[{"name":"eth0","link_state":"up","address":"10.0.0.2","cidr_block":24,
“ip_version":4,"default_gateway_address":"10.0.0.1","friendly_name":"wan”}],
”labels":[{"href":"/orgs/2/labels/1"},{"href":"/orgs/2/labels/
9”}],”service_provider":"service provider","data_center":"central data
center","os_id":"os id 0",”os_detail":"os detail 0","online":true,"agent":
{"config":
{"enforcement_mode":"visibility_only","visibility_level":"flow_summary"}}},
{“name":"web_app2 0","description":"workload desc
0","service_principal_name":”spn
0","hostname":"workload-0.example.com","public_ip":"24.1.3.1",”external_data
_set":"cmdb","external_data_reference":"0",”interfaces":
[{"name":"eth0","link_state":"up","address":"10.0.0.2","cidr_block":24,”ip_v
ersion":4,"default_gateway_address":"10.0.0.1","friendly_name":"wan"}],”labe
ls":[{"href":"/orgs/2/labels/1"},{"href":"/orgs/2/labels/
9"}],”service_provider":"service provider","data_center":"central data
center","os_id":"os id 0",”os_detail":"os detail 0","online":true,"agent":
{"config":{"enforcement_mode":"full", ”visibility_level":"flow_summary"}}}]'
```

Delete a Collection of Workloads

You can use this Public Experimental API to delete a collection of unmanaged workloads.

When you call this method, you identify each unmanaged workload to delete by its HREF. For example:

```
/orgs/7/workloads/XXXXXXX-9611-44aa-ae06-fXXX8903db65
```

If an unmanaged workload has the following two properties:

- `external_data_set=cmdb`
- `external_data_reference=25`

you can construct the HREF as a query parameter that matches the values of these two properties as they are defined on the target workload. For example:

```
/orgs/1/workloads?external_data_set=cmdb&external_data_reference=25
```

NOTE

Both query parameters must match the exact same parameters on the workload for the delete operation to succeed.

URI to Delete a Collection of Workloads

```
PUT [api_version][org_href]/workloads/bulk_delete
```

Request Properties

Property	Description	Type	Required
`href`	The HREF of a specific workload or unmanaged workload using the `external_data_set` and `external_data_reference` query parameters.	String	Yes

Request Body

```
[
 {"href": "/orgs/1/workloads/92f4a252-68d1-40ef-8cf0-b46e4ec551r"},
 {"href": "/orgs/1/workloads/92f4a252-68d1-40ef-8cf0-b46e4ecd642ix"},
 {"href": "/orgs/1/workloads?
external_data_set=cmdb&external_data_reference=25"},
 {"href": "/orgs/1/workloads/92f4a252-74d1-40ef-5af0-b46a4acd333dt"}
]
```

Curl Command to Delete Collection of Workloads

```
curl -i -X PUT https://pce.my-company.com:8443/api/v2/orgs/3/workloads/
bulk_delete -H "Accept: application/json" -u $KEY:$TOKEN '[{ "href": "/
orgs/1/workloads/92f4a252-68d1-40ef-8cf0-b46e4ec551rse" },{"href": "/orgs/1/
workloads/92f4a252-68d1-40ef-8cf0-b46e4ecd642ix" }, {"href": "/orgs/1/
workloads/92f4a252-68d1-40ef-8cf0-b46e4ecd5421q" }, {"href": "/orgs/1/
workloads/92f4a252-68d1-40ef-8cf0-b46e4ecd214dt" }, {"href": "/orgs/1/
workloads/c20efa40-c615-4fa7-b8a1-badbadbadbad" }]'
```

Response

A successful response returns an HTTP 200 message and an array of status objects, one for each workload and one that failed to be deleted as requested. If all unmanaged workloads are successfully deleted, an empty array is returned.

For example, two errors are shown—one where the operation was not allowed (due to lack of permissions) and one where the workload did not exist.

```
[
  {
    "href": "/orgs/1/workloads/c20efa40-c615-4fa7-b8a1-c3af4d34c5f5",
    "errors": [{"token": "method_not_allowed_error", "message": "Not
allowed"}]
  },
  {
    "href": "/orgs/1/workloads/c20efa40-c615-4fa7-b8a1-badbadbadbad",
    "errors": [{"token": "not_found_error", "message": "Not found"}]
  }
]
```

Bulk Import using a CSV File

workloads/bulk_import

This new API is used to update workloads using a CSV file, and the only allowed input type is 'text/csv'.

We recommend users to export a CSV file from the workloads page before they use this import function, so that they can just modify the CSV file they exported with the labels they would like to assign to the workloads.

- `PUT /api/v2/orgs/:xorg_id/workloads/bulk_import?delete_token`
  If the value in the CSVfile for the `label_dimension` is the same as the delete token passed in the request, the label in that label dimension will be deleted for the workload. When users use CSV to update workload labels, they can pass in the delete token in the request to specify the labels to be deleted.
- `PUT /api/v2/orgs/:xorg_id/workloads/bulk_import?create_labels=true/false` (default is false)
  Provides an option in the CSV labels update to create new labels if they don't exist. If the option is `false`, rows with non-existent labels will be skipped entirely.
- `PUT /api/v2/orgs/:xorg_id/workloads/bulk_import?dry_run=true/false` (default is false)
  If users set this parameter to be `true`, the API will only return the potential changes and error tokens without actual changes to the workloads.

Blocked Traffic to and from Workloads

This Public Experimental API was used to identify unauthorized traffic to or from workloads. It would get a list of blocked or potentially blocked traffic between workloads and other entities managed by the PCE.

WARNING
In the 19.1.0 release, blocked traffic was marked for deprecation and is now turned off by default.

WARNING
The functionality previously provided by blocked traffic API is available in Explorer.

WARNING
The Blocked Traffic page continues to work, and when you configure the Explorer feature, this page uses the Explorer API to get the data from PCE.

Pairing Profiles and Pairing Keys

The Public Stable API for pairing profiles gets, creates, updates, and deletes pairing profiles.

The Public Stable API for pairing keys creates a pairing key to use for pairing workloads.

About Pairing Profiles and Keys

Pairing Profiles apply specific properties to workloads as they pair with the PCE, such as labels and the workload policy state.

When you configure a pairing profile, the pairing script contains a unique pairing key at the end of the script (activation-code) that identifies the VEN securely so it can authenticate with the PCE. You can configure a pairing key for one-time use or more, and you can also set time and use limits.

The Pairing Key API can generate a new pairing key from a specified pairing profile.

Pairing Profile Methods

Functionality	HTTP	URI
Get a collection of pairing profiles	`GET`	`[api_version][org_href]/pairing_profiles`
Get the specified pairing profile	`GET`	`[api_version][org_href]/pairing_profile_href`
Create an individual pairing profile	`POST`	`[api_version][org_href]/pairing_profiles`
Update an individual pairing profile	`PUT`	`[api_version][pairing_profile_href]`
Delete an individual pairing profile	`DELETE`	`[api_version][pairing_profile_href]`

Get Pairing Profiles

This method allows you to get a collection of all pairing profiles in your organization or just an individual pairing profile.

By default, the maximum number returned on a GET collection of pairing profiles is 500. For more than 500 pairing profiles, use an Asynchronous GET Collection.

URI to Get a Collection of Pairing Profiles

```
GET [api_version][org_href]/pairing_profiles
```

Curl Command to Get Collection of Pairing Profiles

```
curl -i -X GET https://pce.my-company.com:8443/api/v2/orgs/1/
pairing_profiles -H 'Accept: application/json' -u $KEY:'TOKEN'
```

Parameters for Pairing Profiles

Parameter	Description	Type
org_id	Organization ID	
agent_software_release	The agent software release for pairing profiles.	
description	The long description of the pairing profile. Supports partial matches.	String
external_data_set	The data source from which the resource originates. For example, if the pairing profile information is stored in an external database.	String NULL
external_data_reference	External data reference identifier	String Null
name	The short, friendly name of the pairing profile. Supports partial matches.	String
labels[]	Return only pairing profiles that have all of these labels specified as part of the pairing profile. Labels are structured in JSON as a list of lists of label HREFs.	Array
ven_type	Specifies the pairing profile by the VEN type: server, endpoint, or specified_during_activation	String

Properties for Pairing Profiles

All properties are required

Property	Description	Type
`name`	The short friendly name of the Pairing Profile	String
`description`	The long description of the pairing profile. Supports partial matches.	String
`mode`	Reference to the common schema `legacy_workload_modes.schema.json`	String
`enabled`	The enabled flag of the pairing profile	Boolean
`total_use_count`	The number of times the Pairing Profile has been used	Integer
`allowed_uses_per_key`	The number of times the pairing profile can be used. Minimum: 1	String
`key_lifespan`	Number of seconds pairing profile keys will be valid for. Minimum: 1	Integer (min 1)
`last_pairing_at`	Timestamp when this pairing profile was last used for pairing a workload	String NULL
`created_at`	Timestamp when this pairing profile was first created	String date-time
`updated_at`	Timestamp when this pairing profile was last updated	String date-time
`created_by`	User who originally created this pairing profile Reference by common schema `href_object.schema.json`	Object String
`updated_by`	User who last updated this pairing_profile Reference by common schema `href_object.schema.json`	
`last_pairing_key_generated_at`	Timestamp of when the last pairing key was generated • Null • Refenced by the common shema `href_object.schema.json`	String, Null date/time
`last_pairing_key_generated_by`	The user who generated the last pairing key	
`is_default`	Flag indicating this is the default auto-created Pairing Profile	Boolean
`labels`	Reference to `labels.schema.json`	
`env_label_lock`	The flag that controls whether env label can be overridden from the pairing script	Boolean

Property	Description	Type
loc_label_lock	The flag that controls whether loc label can be overridden from the pairing script	Boolean
app_label_lock	The flag that controls whether app label can be overridden from pairing script	Boolean
enforcement_mode_lock	The flag that controls whether enforcement mode can be overridden from pairing script	Boolean
mode_lock	DEPRECATED AND REPLACED | (USE /enforcement_mode_lock INSTEAD) Flag that controls whether mode can be overridden from the pairing script.	Boolean
log_traffic	DEPRECATED AND REMOVED. Alerting status	Boolean
log_traffic_lock	DEPRECATED AND REMOVED. The flag that controls whether log_traffic can be overridden from pairing script	Boolean
visibility_level_lock	The flag that controls whether visibility_level can be overridden from pairing script	Boolean
status_lock	The flag that controls whether status can be overridden from pairing script	Boolean
external_data_set	External data set identifier	String, Null
external_data_reference	External data reference identifier	String, Null
agent_software_release	Agent software release associated with this paring profile	String, Null
ven_type	Referenced to common/pairing_profile_ven_type.schema.json	

Examples of query parameters for filtering pairing profiles:

Filter by Name:

```
/api/v2/orgs/1/pairing_profiles?name=prod_app
```

Filter by Description:

```
/api/v2/orgs/1/pairing_profiles?description="some descriptionstring"
```

Filter by software release:

```
/api/v2/orgs/1/pairing_profiles?agent_software_release="xx.x.x"
```

Response Body

The response includes generated pairing keys.


```
{
     "href": "/orgs/4002/pairing_profiles/4101",
     "name": "org 3 pp 1",
     "description": "org 3 pp 1",
     "total_use_count": 0,
     "enabled": true,
     "is_default": false,
     "created_at": "2022-01-21T00:44:16.863Z",
     "updated_at": "2022-01-21T00:44:16.863Z",
     "created_by": {"href"=>"/users/0"},
     "updated_by": {"href"=>"/users/0"},
     "mode": "illuminated",
     "enforcement_mode": "visibility_only",
     "key_lifespan": "unlimited",
     "allowed_uses_per_key": "unlimited",
     "last_pairing_at": nil,
     "last_pairing_key_generated_at": "2022-01-21T00:49:13.841Z",
     "last_pairing_key_generated_by": {"href"=>"/users/6"},
     "labels": [{"href"=>"/orgs/4002/labels/4104"}],
     "env_label_lock": true,
     "loc_label_lock": true,
     "role_label_lock": true,
     "app_label_lock": true,
     "mode_lock": true,
     "enforcement_mode_lock": true,
     "log_traffic": false,
     "log_traffic_lock": true,
     "visibility_level": "flow_summary",
      "visibility_level_lock": true,
      "agent_software_release": "Default (19.3.0)",
      "caps": ["write", "generate_pairing_key"]
}
```


Create a Pairing Profile

This method creates an individual pairing profile. The only required parameter for POST method is `enabled`, others are optional.

URI to Create a Pairing Profile

```
POST [api_version][org_href]/pairing_profiles
```

Example Request Body


```
{
  "href": "/orgs/2/pairing_profiles/12375",
  "name": "Limited Pairing",
  "description": "",
  "total_use_count": 0,
  "enabled": true,
  "is_default": false,
  "created_at": "2015-11-01T01:20:06.135Z",
```

```
  "updated_at": "2015-11-01T01:20:06.135Z",
  "created_by": {
    "href": "/users/18"
  },
  "updated_by": {
    "href": "/users/18"
  },
  "enforcement_mode": "visibility_only",
  "key_lifespan": "unlimited",
  "allowed_uses_per_key": "unlimited",
  "last_pairing_at": null,
  "labels": [
    {
      "href": "/orgs/2/labels/6"
    },
    {
      "href": "/orgs/2/labels/14"
    },
    {
      "href": "/orgs/2/labels/8"
    },
    {
      "href": "/orgs/2/labels/12"
    }
  ],
  "env_label_lock": false,
  "loc_label_lock": false,
  "role_label_lock": false,
  "app_label_lock": false,
  "mode_lock": true,
  "visibility_level": "flow_summary",
  "visibility_level_lock": true
}
```

Curl Command to Create Pairing Profile

```
curl -i -X POST https://pce.my-company.com:8443/api/v2/orgs/2/
pairing_profiles -H "Content-Type:application/json" -u $KEY:'TOKEN'-d
'{"href":"/orgs/2/pairing_profiles/12375","name":"Limited
Pairing","description":"","total_use_count":0,"enabled":true,"is_default":fa
lse,"created_at":"2015-11-01T01:20:06.135Z","updated_at":"2015-11-01T01:20:0
6.135Z","created_by":{"href":"/users/18"},"updated_by":{"href":"/users/
18"},"enforcement_mode":"visibility_only","key_lifespan":"unlimited","allowe
d_uses_per_key":"unlimited","last_pairing_at":null,"labels":[{"href":"/
orgs/2/labels/6"}, "href":"/orgs/2/labels/14"},"href":"/orgs/2/labels/
8"},"href":"/orgs/2/labels/
12"}],"env_label_lock":false,"loc_label_lock":false,"role_label_lock":false,
"app_label_lock":false,"visibility_level":"flow_summary","visibility_level_l
ock":true}'
```

Update a Pairing Profile

To update a pairing profile, specify its HREF, which can be obtained from getting a collection of pairing profiles.

URI to Update a Pairing Profile

```
PUT [api_version][pairing_profile_href]
```

Curl Command to Update Pairing Profile

```
curl -i -X PUT https://pce.my-company.com:8443/api/v2/orgs/2/
pairing_profiles -H "Accept: application/json" -u $KEY:'TOKEN'-d '{"href":"/
orgs/2/pairing_profiles/12375","name":"Limited
Pairing","description":"","total_use_count":0,"enabled":true,"is_default":fa
lse,"created_at":"2015-11-01T01:20:06.135Z","updated_at":"2015-11-01T01:20:0
6.135Z","created_by":{"href":"/users/18"},"updated_by":{"href":"/users/
18"},"enforcement_mode":"visibility_only","key_lifespan":"unlimited","allowe
d_uses_per_key":"one_use","last_pairing_at":null,"labels":[{"href":"/orgs/2/
labels/6"},{"href":"/orgs/2/labels/14"},{"href":"/orgs/2/labels/8"},
{"href":"/orgs/2/labels/
12"}],"env_label_lock":false,"loc_label_lock":false,"role_label_lock":false,
"app_label_lock":false,"visibility_level":"flow_summary","visibility_level_l
ock":true}'
```

Delete a Pairing Profile

To delete an individual pairing profile, specify its HREF that you can obtain from a collection of pairing profiles.

URI to Delete a Pairing Profile

```
DELETE [api_version][pairing_profile_href]
```

Curl Command to Delete Pairing Profile

```
curl -i -X DELETE https://pce.my-company.com:8443/api/v2/orgs/2/
pairing_profiles/12375 -H "Accept: application/json" -u $KEY:'TOKEN'
```

Pairing Key API Method

Functionality	HTTP	URI
Create a pairing key	POST	[api_version][org_href]/pairing_profiles[pairing_profile_href]/pairing_key

Create a Pairing Key

To create a pairing key, you need a pairing profile HREF to pass as a parameter. You can obtain the pairing profile HREF from the pairing profile page in the PCE web console.

A pairing key is governed by the parameters configured in the pairing profile.

URI to Create a Pairing Key

Obtain the pairing key HREF from the response body returned by an API call to get a collection of pairing keys.

```
POST [api_version][pairing_key_href]/pairing_key
```

Request Body

The request body is an empty JSON object.

```
{}
```

Curl Command to Create Pairing Key

```
curl -i -X POST https://pce.my-company.com:8443/api/v2/orgs/3/
pairing_profiles/34/pairing_key -H 'Content-Type: application/json' -u
$KEY:'TOKEN' -d "{}"
```

VEN Operations

Overview of VEN Suspension

The VEN Update API (`PUT [api-version][ven-href]`) allows you to mark a VEN as either suspended or unsuspended in the PCE. It does not, however, actually suspend or unsuspend the VEN.

To suspend a VEN, use the `illumio-ven-ctl` command-line tool, which isolates a VEN on a workload so that you can troubleshoot issues and determine if the VEN is the cause of any anomalous behavior.

When you suspend a VEN, the VEN informs the PCE that it is in suspended mode.

However, if the PCE does not receive this notification, you must mark the VEN as "Suspended" in the PCE web console (select the VEN and click **Edit**), or you can use this API to mark the VEN as suspended.

When you don't mark the VEN as suspended in the PCE, the PCE assumes that the workload is offline and removes it from the policy after one hour. When you mark the VEN as suspended, that VEN's workload is still included in the policy of other workloads.

When a VEN is suspended:

- The VEN still appears in the PCE on the VEN list page.
- The VEN's host cannot be unpaired.
- An organization event (`server_suspended`) is logged. This event is exportable to CEF/LEEF and has the severity of WARNING.
- Heartbeats or other communications are not expected, but when received, all communications are logged by the PCE.
- If the PCE is rebooted, the VEN remains suspended.
- Any custom iptables rules are removed, and you need to reconfigure them manually.

When a VEN is unsuspended:

- The PCE is informed that the VEN is no longer suspended and can receive policy from the PCE. If existing rules affect the unsuspended workload, the PCE reprograms those rules.
- An organization event (`server_unsuspended`) is logged. This event is exportable to CEF/LEEF and has the severity of WARNING.
- The workload reverts to the policy state it had before it was suspended.
- Custom iptables rules are configured back into the iptables.

VEN upgrade APIs allow you to specify an array of VEN HREFs to upgrade to a specific version instead of a list of agent ID's.

Rules when validating with the VEN upgrade APIs are as follows:

- No downgrades are allowed.
- Users cannot upgrade to a VEN version higher than the PCE version.
- No AIX, Solaris, or C-VEN are allowed.
- Users can only upgrade VENs paired to the same region.
- Only workload managers can upgrade VENs, and they can only upgrade VENs within their scope.

VEN API Methods

In addition to the page in the PCE web console that lists all VENs and shows the details of a single VEN, there is a Public Experimental API for getting VEN collections and VEN instances. Other new APIs support VEN filtering in the PCE web console and update and unpair VENs.

VEN Methods	HTTP	URI
Get the collection of all VENs (The `href` property in each interface in the VEN interfaces array is dropped from the response.)	`GET`	`[api_version][org_href]/vens/`
Get details on a VEN instance (The `href` property in each interface in the VEN interfaces array is dropped from the response)	`GET`	`[api_version][org_href]/vens/ven_id`
Use to get the default release without iterating through the whole collection.	`GET`	`[api_version[org_href]/software/vens/default`

Support VEN filtering in the PCE web console.	`GET`	`[api_version][org_href]/vens/autocomplete`
		
		`[api_version][org_href]/vens/facets`

To set the `target_pce_fqdn` on a VEN	`PUT`	`[api_version][org_href]/vens/ven_id`
Update a VEN	`PUT`	`[api_version][org_href]/vens/update`
Upgrade a VEN. This API accepts a list of `hrefs` instead of `agent_ids`. The upgrade endpoint falls under `/vens/resource` instead of the `/software/resource`.	`PUT`	`[api_version][org_href]vens/upgrade`
Lists the VEN releases available to the org, one per VEN version, along with metadata such as whether it is the default version, whether that release supports servers and/or endpoints, and so on. The list of images is longer than the list of releases, and multiple images belong to the same release version.	`GET`	`[api_version]/software/ven/releases`
Shows the full list of VEN images. There is one image for each Linux distribution we support (such as RHEL, Ubuntu), plus images for Windows and macOS.	`GET`	`[api_version]/software/ven/releases-images`
Unpair a VEN: trigger the unpairing of one or more VENs. **NOTE**: This endpoint replaces `/workloads/unpair`, which is deprecated.	`PUT`	`[api_version][org_href]/vens/unpair`
Provided so that users can set the default version for VEN pairing.	`PUT`	`[api_version][org_href]/software/vens/default`

VEN Parameters

Parameter	Description	Type	Required
`org_id`	Organization ID	Integer	Yes
`activation_type`	The method by which the VEN was activated	String	No
`active_pce_fqdn`	FQDN of the PCE	String	No
`activation_recovery`	Return VENs in or not in authentication recovery	Boolean	No
`condition`	A specific error condition to filter by	String	No
`container_clusters`	An array of container cluster URIs, encoded as a JSON string	Object	No
`disconnected_before`	Return VENs that have been disconnected since the given time.	date/time	No
`health`	The overall health (condition) of the VEN	String	No
`hostname`	The hostname of VEN(s) to return. Supports partial matches.	String	No
`ip_addressl`	IP address of VEN(s) to return. Supports partial matches	Sring	No
`last_goodbye_at`	The time (rfc3339 timestamp) of the last goodbye from the VEN.	String, Null	
`os_platform`	OS platform of the host managed by the VEN	String, Null	
`version`	Software version of the VEN.	String	
`status`	The current status of the VEN. Options are: "active", "suspended", "uninstalled"	String	
`activation_type`	The method in which the VEN was activated. Options are: "pairing_key", "kerberos", "certificate"	String, Null	No
`active_pce_fqdn`	The FQDN of the PCE that the VEN last connected to	String, Null	No
`target_pce_fqdn`	cluster FQDN for target PCE	String, Null	
`labels`	Labels assigned to the host managed by the VEN.	Array	
`interfaces`	Network interfaces of the host managed by the VEN.	Array	
`workloads`	The only required property is **HREF**, the others are optional: `name`, `managed`, `hostname`, `os_id`, `os_detail`, `labels`, `interfaces`, etc.	Array	
`description`	Description of VEN(s) to return. Supports partial matches	String, Null	

Parameter	Description	Type	Required
`last_heartbeat_at`	The last time (rfc3339 timestamp) a heartbeat was received from this VEN.	String, Null	
`status`	VEN Status: • "active" • "suspended"	String	
`ven_type`	The `ven_type` property is introduced through the reference to a common schema `ven_type.schema.json`:	String	No

Properties

Parameter	Description	Type	Required
`ven_type`	The type of the release marked as default: "server", "endpoint"	String	No
`default_release_ven_types`	The type of the release marked as default	String	
`name`	Friendly name for the VEN	String, Null	
`hostname`	The hostname of the host managed by the VEN	String, Null	Yes
`uid`	The unique ID of the host managed by the VEN	String, Null	
`os_id`	OS identifier of the host managed by the VEN	String, Null	
`os_detail`	Additional OS details from the host managed by the VEN	Sring, Null	
`os_platform`	OS platform of the host managed by the VEN	String, Null	
`version`	Software version of the VEN.	String	
`status`	The current status of the VEN. Options are: "active", "suspended", "uninstalled"	String	
`activation_type`	The method in which the VEN was activated. Options are: "pairing_key", "kerberos", "certificate"	String, Null	No
`active_pce_fqdn`	The FQDN of the PCE that the VEN last connected to	String, Null	No
`target_pce_fqdn`	cluster FQDN for target PCE	String, Null	
`labels`	Labels assigned to the host managed by the VEN.	Array	
`interfaces`	Network interfaces of the host managed by the VEN.	Array	
`workloads`	The only required property is `HREF`, the others are optional: `name`, `managed`, `hostname`, `os_id`, `os_detail`, `labels`, `interfaces`, etc. `managed`: `True` if the workload is managed, else `false`.	Array	
`container_clusters`	Array of container cluster URIs, encoded as a JSON string	Object	No

Parameter	Description	Type	Required
`secure_connect`	Issuer name match criteria for certificate used during establishing secure connections	Object, Null	
`last_heartbeat_at`	The last time (rfc3339 timestamp) a heartbeat was received from this VEN.	String, Null	
`last_goodbye_at`	The time (rfc3339 timestamp) of the last goodbye from the VEN.	String, Null	
`status`	VEN Status: • "active" • "suspended"	String	
`disconnected_before`	Return VENs that have been disconnected since the given time	date/time	
`health`	The overall health (condition) of the VEN	String	
`ip_address`	IP address of VEN(s) to return. Supports partial matches	String	
`firewall_restore`	The strategy to use to restore the firewall state after the VEN is uninstalled. The strategy to use to restore the firewall state after the VEN is uninstalled: Options are: `saved`, `default`, and `disable`. The default is: `default`. Works with `vens_unpair_put`.	String	
`ven_id`	VEN ID (works with `GET /api/v2/orgs/{org_id}/vens/{ven_id}`)	String	
`vens`	VENs to unpair (works with `PUT /api/v2/orgs/{org_id}/vens/unpair`) Required property: `href`	Array	Yes
`secure_connect`	Property: `matching_issuer_name`. Issuer name match criteria for certificate used during establishing secure connections. `matching_issuer_name`: Issuer name match criteria for certificate used while establishing secure connections.	Object String	
`security_policy_applied_at`	Last reported time when policy was applied to the workload (UTC), only present in expanded representations.	`date-time`	
`security_policy_received_at`	Last reported time when policy was received by the workload (UTC), only present in expanded representations.	`date-time` Null	

Parameter	Description	Type	Required
`enforcement_mode`	Policy enforcement mode, only present in expanded representations. Options are: "idle", "visibility_only", "full", "selective"	String	
`visibility_level`	The amount of data the VEN collects and reports to the PCE from a workload in the enforced mode (policy state), so you can control resource demands on workloads. The higher levels of detail are useful for visualizing traffic flows in the Illumination map inside the PCE web console. If this parameter is not set, then VEN visibility level is set to `flow_summary`. • `flow_summary`: ("High Detail" in the PCE web console) The VEN collects traffic connection details (source IP, destination IP, protocol, and source and destination port) for both allowed and blocked connections. This option creates traffic links in the Illumination map and is typically used during the building and testing phase of your security policy. • `flow_drops`: ("Less Detail" in the PCE web console.) The VEN only collects traffic connection details (source IP, destination IP, protocol, and source and destination port) for blocked connections. This option provides less detail for Illumination but demands fewer system resources from a workload and is typically used for policy enforcement. • `flow_off`: ("No Detail" in the PCE web console.) The VEN does not collect any details about traffic connections. This option provides no Illumination detail and demands the least amount of resources from workloads. This mode is useful when you are satisfied with the rules that have been created and do not need additional overhead from observing workload communication.	String	
`upgrade_pending`	Only return VENs with/without a pending upgrade	Boolean	No
`ven_type`	The `ven_type` property is introduced through the reference to a common schema `ven_type.schema.json`:	String	No
`upgrade_expires_at`	The time (rfc3339 timestamp) at which the PCE stops attempting VEN upgrade	String. Null	No

Parameter	Description	Type	Required
upgrade_target_version	The software release to upgrade to	String, Null	No
upgrade_timeout_seconds	Number of seconds during which the PCE tries to trigger the agent upgrade: "minimum": 900, "maximum": 15552000	Integer	

Software VEN Releases

release_ven_types

```
{
    "$schema": "hp://json-schema.org/draft-04/schema#",
    "description": "Supported ven types in this release",
    "type": "array",
    "items": {
        "type": "string",
            "enum": ["server", "endpoint"]
        }
}
```

The new common schema `release_ven_types` is introduced to show `ven_types` for each release and to filter releases by `ven_type`.

Previously, the `ven_type` was not stored for the release, and database records looked as follows:

Release	Distributiion
22.5.1	CentOS
22.5.1	MacOS
22.5.1	Windows

With the property `ven_type` added, the database records are expanded with an additional `ven_types` column:

Release	Distributiion	ven_types
22.5.1	CentOS	server + endpoint
22.5.1	MacOS	server + endpoint
22.5.1	Windows	server + endpoint

Note that in release 22.5.1 the code supports the type "server+endpont". However, Centos (Linux) supports a server-only VEN image, MasOS supports endpoint-only image, and Windows supports both server and endpoint:

Release	Distributiion	ven_types
22.5.1	CentOS	server
22.5.1	MacOS	endpoint
22.5.1	Windows	server + endpoint

When a user opens the list of release images via UI and looks for the type `server + endpoint`, only the Windows image will show up as a complete match.

To fix this issue, the `ven_type` is now based on release and distribution:

- All releases before 21.2.2 were just `server` (there was no endpoint)
- Any release with 22.3.x was `endpoint` (there was no server)
- Any other releases were `server + endpoint` , but instead of setting it to all the images (database records), the `ven_types` are set in a way that is specific for the Os.

GET VENs

To get a collection of VENs that have a specific label applied to them, take a label string that was returned when you got a collection of VENs, and then add a query parameter to GET all VENs with that specific label.

Curl Command to Get VENs with a Specific Label

```
curl -i -X GET https://pce.my-company.com:8443/api/v2/orgs/2/vens?
labels="[[/orgs/2/labels/1642]]" -H "Accept: application/json" -u
$KEY:$TOKEN
```

To restrict the type of VENs you want returned and set a limit on how many results you want returned, use the relevant query parameters. For example, you might want to get a collection of no more than 50 VENs running CentOS 6.3 that have an active status.

Curl Command to Get VENs using other Query Parameters

```
curl -i -X GET https://pce.my-company.com:8443/api/v2/orgs/2/
vens?os_id=centos-x86_64-6.3&max_results=50&status=active -H "Accept:
application/json"-u $KEY:$TOKEN
```

Unpairing and Suspending VENs

Instead of unpairing and suspending workloads, use the new VEN APIs to unpair and suspend VENs.

NOTE

The endpoint `workloads/unpair` is DEPRECATED. Use `/vens/unpair` instead.

Curl Command for Unpairing VENs

```
curl -i -X PUT https://pce.my-company.com/api/v2/orgs/3/vens/unpair -H
"Content -Type:application/json" -u $KEY:$TOKEN -d '{"vens": [{"href": "/
orgs/7/vens/xxxxxxxx-9611-44aa-ae06-fXXX8903db65"}, {"href": "/orgs/7/vens/
xxxxxxxx-9611-xxxx-ae06-f7bXXX03db71"}], "firewall_restore": "default"}'
```

Curl Command to Mark VEN as Suspended

```
curl -i -X PUT https://pce.my-company.com/api/v2/orgs/3/vens/xxxxxxxx-9611-
xxxx-ae06-f7bXXX03db71 -H "Content-Type:application/json" -u $KEY:$TOKEN
-d'{"status":"suspended"}'
```

Network Enforcement Nodes (NEN) APIs

Network Enforcement Node Reassignment

`network_enforcement_nodes_put`

This API is used to change the target PCE FQDN of an agent.

It updates the `target_pce_fqdn` property so that the NEN can be managed by a different PCE in a Supercluster.

Change Target PCE

When you have the NEN HREF, you can update the target PCE with the PCE FQDN the NEN will use. In your JSON request body, pass the following data:

```
    "target_pce_fqdn": "new-pce-fqdn.example.com"
}
```

The URI for this operation is:

```
PUT [api_version][nen_href]/update
```

This curl example shows how you can pass the `target_pce_fqdn` property containing the `FQDN` of the new PCE:

```
curl -u
api_xxxxxxx64fcee809:'xxxxxxx5048a6a85ce846a706e134ef1d4bf2ac1f253b84c1bf8df
6b83c70d95' -H "Accept: application/json" -H "Content-Type:application/
json" -X PUT -d '{"target_pce_fqdn":"new-pce-fqdn.example.com"}' https://
```

```
my.pce.supercluster:443/api/v1/orgs/3/network_enforcement_nodes/f67d35d5-
ea71-42da-b40d-8dcc3b1420c2/update
```

Authorization and Exposure Changes

Some of the existing Experimental APIs have been changed in release 23.5.0 to facilitate creation of fully scripted integrations of endpoint management systems with the PCE using the Network Enforcement Nodes (NEN) Switch integration capabilities.

Exposure Changes

Exposure of the listed NEN APIs was changed in release 23.5.0 from Public Experimental to Public Stable.

Authorization Changes

Authorization of some NEN APIs was changed in release 23.5.0 from the default ("Global Administrator" and "Global Organization Owner") to authorize additional users as listed in the table.

API	Exposure Change	New Authorization Change
network_device_config	YES	NO
network_device_get	YES	NO
network_device_network_end-point_get	YES	NO
network_devices_enforcement _in-structions_applied_post	YES	"Global Policy Object Provisioner" and " Ruleset Provisioner"
network_devices_enforcement _in-structions_request_post	YES	"Global Policy Object Provisioner" and " Ruleset Provisioner"
network_devices_get	YES	"Global Policy Object Provisioner", "Global Read Only", "Limited Ruleset Manager", "Ruleset Provisioner", "Ruleset Viewer", "Workload Manager"
network_devices_multi_enforce-ment _instructions_applied_post	YES	"Global Policy Object Provisioner" and " Ruleset Provisioner"
network_devices_multi_enforce-ment _instructions_request_post	YES	"Global Policy Object Provisioner" and " Ruleset Provisioner"
network_devices_network_end-points_get	YES	NO
network_devices_network_end-points_post	YES	"Workload Manager"
network_devices_network_end-points_put	YES	"Workload Manager"
network_devices_put	YES	"Workload Manager"
network_endpoint_config	YES	NO
network_enforcement_node_get	YES	NO
network_enforcement_nodes_get	YES	"Full Ruleset Manager", "Global Policy Object Provisioner", "Global Read Only", "Limited Ruleset Manager", "Ruleset Provisioner", "Ruleset Viewer", "Workload Manager"
network_enforcement_nodes_net-work_devices_post	YES	"Workload Manager"
network_enforcement_nodes_put	YES	NO

Filtering and Aggregating Traffic

This Public Stable API method allows you to handle broadcast and multicast traffic better, save storage in the traffic database, and reduce the stress of the whole data pipeline.

Windows-heavy environments can have a large amount of broadcast or multicast traffic, which can be as much as 50% in syslog data and 30% in traffic data. Because some broad-

cast and multicast data might not be useful for writing policies, this API provides a function to filter out or aggregate the broadcast and multicast traffic that is not useful.

NOTE

This API is implemented in Supercluster.

NOTE

Only administrators and users with appropriate privileges can make filtering changes.

Traffic Collector API Methods

Use these methods to get, create, update, or delete a traffic collector.

Functionality	HTTP	URI
Get a traffic collector collection.	`GET`	`[api_version][org_href]/settings/traffic_collector`
Get a specific collector instance.	`GET`	`[api_version][org_href]/settings/traffic_collector/:uuid`
Create a traffic collector.	`POST`	`[api_version][org_href]/settings/traffic_collector`
Update a specific traffic collector instance.	`PUT`	`[api_version][org_href]/settings/traffic_collector/:uuid`
Delete a specific traffic collector instance.	`DELETE`	`[api_version][org_href]/settings/traffic_collector/:uuid`

Parameters

Parameters	Description	Type
`org_id`	Org ID	Integer
`traffic_collector_setting_id`	traffic_collector setting UUID	String

These are the properties of Traffic Collector Methods

Property	Description	Type
`href`	URI of the destination	String
`transmis-sion`	(For the transmission type, choose `broadcast`, `multicast` or `unicast`	String
`action`	Drop or aggregate the target traffic: • If you select "drop," the PCE drops all the traffic that matches the filters you supply. The data will be lost forever. • If you select "aggregate," the PCE aggregates broadcast and multicast traffic. If multiple workloads receive one broadcast or multicast traffic flow, all reported flows on the same traffic are aggregated into one record in the traffic database, and the destination workload information will be lost. • The PUT method will fail if you change the aggregator from “broadcast” to “multi-cast” because the default port and protocol will not pass the validation step.	String
`target`	(PUT, POST) The target object has the following properties: • `dst_port`: Single destination ip address or CIDR . Can be an Integer or NULL • `proto`: Port is required for POST • `dst_ip`: Single destination ip address or CIDR • `src_port`: Single source ip address or CIDR. Allows users to filter traffic based on the source port. • `src_ip`: Single source ip address or CIDR If `dst_port` and `dst_ip` are not specified for the target session, traffic is dropped on "all ips" and "all ports" by default. The PUT method will fail If the traffic filter you want to modify has “ANY” in the port or protocol field and you want to modify other fields in this filter. The change will fail because the default port and protocol will not pass the validation step. Oracle flows are currently filtered via a runtime `src_ip/dst_ip` (CIDR) setting and this feature is not available in SaaS. Runtime changes also require a PCE restart, while API settings do not. The collector filters now support `src_ip` (CIDR) so various filters can be created per organization without restarting the PCE.	Object Integer Integer String String
`data_source`	Flow summary data source to support more granular filters, particularly for endpoints.	String
`network`	A flow summary network is needed to support more granular filters, for endpoints in particular.	String

Examples of Traffic Collector

CURL Command for settings_traffic_collector_post

```
curl -i -u
api_10415cd5bcc0e14cc:'2ac31cbee8cd3e8fa7ca79d32d39a0249636624ada675965dd2ec
239e3ea8af0' --request POST --data
'{"action":"drop","transmission":"unicast","target":
```

```
{"proto":6,"src_ip":"10.1.2.3"}}' https://2x2testvc360.ilabs.io:8443/api/v2/
orgs/2/settings/traffic_collector --header "Content-Type: application/json"
```

Broadcast Transmission and Drop Action

```
curl 'https://pce.my-company.com:8443/api/v2/orgs/1/settings/
traffic_collector' -H 'Origin: https://pce.my-company.com:8443' -H 'Accept-
Encoding: gzip,deflate, br' -H 'content-type: application/json' -H 'accept:
application/json' -H 'Referer: https://pce.my-company.com:8443/' -i -u
api_1dfe2432a7b314ee6:'21c10ea1a4ad38d76ef22977e8ac45bc10839c5cc6ebffd650eae
4f95dc5b364'--data-binary '{"transmission": "broadcast","action":
"drop","target":{"proto": 17,"dst_port": 20, "dst_ip":"10.255.255.255"}}' --
compressed
```

Multicast Transmission and Aggregate Action

```
curl 'https://pce.my-company.com:8443/api/v2/orgs/1/settings/
traffic_collector' -H 'Origin: https://pce.my-company.com:8443' -H 'Accept-
Encoding: gzip, deflate, br' -H 'content-type: application/json' -H
'accept: application/json' -H 'Referer: https://pce.my-company.com:8443/'
-i -u
api_1dfe2432a7b314ee6:'21c10ea1a4ad38d76ef22977e8ac45bc10839c5cc6ebffd650eae
4f95dc5b364'--data-binary '{"transmission": "multicast","action":
"aggregate"} ' --compressed
```

Example Response

```
{
    "$schema": "http://json-schema.org/draft-04/schema#",
    "type": "object",
    "required": ["href", "transmission", "action"],
    "properties":{
        "href": {
            "description": "URI of the destination",
            "type": "string"
        },
        "transmission":{
            "description":"transmission type: broadcast/multicast",
            "type":"string",
            "enum":[
            "broadcast",
            "multicast"
            ]
        },
        "target":{
            "type":"object",
            "required":[
            "proto"
            ],
            "properties":{
            "dst_port":{
            "type":"integer"
            },
            "proto":{
            "type":"integer"
```

```
            },
            "dst_ip":{
            "type":"string",
            "description": "single ip address or CIDR"
            }
            }
        },
        "action":{
            "description":"drop or aggregate the target traffic",
            "type":"string",
            "enum":[
            "drop",
            "aggregate"
            ]
            }
        }
    }
```

Events Administration and REST APIs

Overview of Events Administration

This section describes how to do typical administration tasks related to PCE events.

Before You Begin

Illumio recommends that you be familiar with the following technology:

- Solid understanding of Illumio Core
- Familiarity with syslog
- Familiarity with your organizations' Security Information and Event Management (SIEM) systems

About This Guide

This guide provides the following information to administer your PCE deployment:

- An overview of events and SIEM integration
- Events setup considerations
- Event record formats, types, and common fields
- Event types by resource
- SIEM integration considerations and recommendations

See also the following related documentation:

- U.S. National Institute for Standards and Technology's NIST 800-92 Guide to Computer Security Log Management
- U.S. Department of Homeland Security National Cybersecurity Center

Notational Conventions in This Guide

- Newly introduced terminology is italicized. Example: *activation code* (also known as pairing key)
- Command-line examples are monospace. Example: `illumio-ven-ctl --activate`
- Arguments on command lines are monospace italics. Example: `illumio-ven-ctl --activate activation_code`
- In some examples, the output might be shown across several lines but is actually on one single line.
- Command input or output lines not essential to an example are sometimes omitted, as indicated by three periods in a row. Example:

```
...
some command or command output
...
```

Events Framework

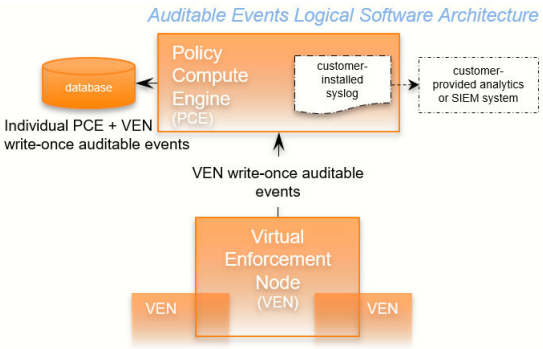
The Illumio events framework provides an information-rich, deep foundation for actionable insights into the operations of Illumio Core.

Overview of the Framework

Auditable events are records of transactions collected from the following management interfaces:

- PCE web console
- REST API
- PCE command-line tools
- VEN command-line tools

All actions that change the configuration of the PCE, security policy, and the VENs are recorded, including workload firewall tampering.



As required by auditing standards, every recorded change includes a reference to the program that made the change, the change's timestamp, and other fields. After recording, the auditable events are read-only.

Auditable events comply with the Common Criteria Class FAU Security Audit requirements standard for auditing.

Auditing Needs Satisfied by Framework

Need	Description	See topic...
Audit and Compliance	Evidence to show that resources are managed according to rules and regulatory standards.	Events Record Information [316]
Resource Lifecycle Tracking	All information necessary to track a resource through creation, modification, and deletion.	Events Lifecycle for Resources [314]
Operations	Trace of recent changes to resources.	Events Lifecycle for Resources [314]
Security	Evidence to show which changes failed, such as incorrect user permissions or failed authentication.	User Password Update Failed (JSON) [335]

Benefits of Events Framework

The events framework in the Illumio Core provides the following benefits:

- Exceeds industry standards
- Delivers complete content
  - Comprehensive set of event types
  - Includes more than 200 events
  - Additional notable system events are generated
- Easily accessible interfaces to capture events:
  - Event Viewer in the PCE web console
  - REST API with filtering
  - SIEM intregration
  - Events are the same across all interfaces
- Designed for customer ease of use
  - Flattened, common structure for all events
  - Eliminates former duplicate or multiple events for single actions
  - Streamed via syslog in JSON, CEF, or LEEF format
  - Create/Update/Delete REST APIs recorded as events

    Read APIs/GET requests are not recorded, because they do not change the Illumio Core.

Events Lifecycle for Resources

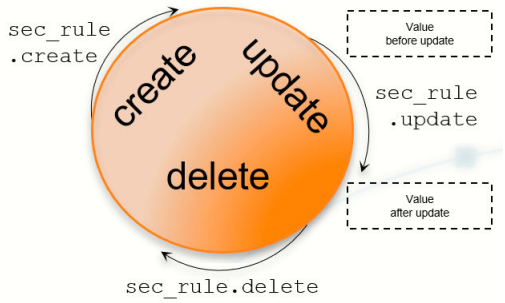
Illumio resources progress through the lifecycle stages (creation, updating, deletion) and Illumio Core records them with the appropriate event types.

About the Lifecycle

Many resources have a lifecycle from creation through update to deletion. For example, the events related to a security policy rule (identified by the resource name `sec_rule`) are recorded with the following event types.

- `sec_rule.create`
- `sec_rule.update`: Update events record with the values of the resource object both before and after the event for a lifecycle audit trail.
- `sec_rule.delete`

Auditable Events: Lifecycle of a Resource



Other Resource Lifecycles

Some resources have unique characteristics and do not follow the create-update-delete pattern. For example, workloads have the following event types:

- `workload.update`
- `workload.upgrade`
- `workload.redetect_network`
- `workload.recalc_rules`
- `workload.soft_delete`
- `workload.delete`
- `workload.undelete`

Events Described

This section describes the concepts and types of PCE events.

Event Types, Syntax, and Record Format

When working with events, it is important to recognize their type, REST API schema, syntax, and record information.

Types of Events

The Illumio Core includes the following general categories of auditable events:

- Organizational events: Organizational events are further grouped by their source:
  - API-related events: Events occurring from a use of the REST API, including the PCE web console
  - System-related events: Events caused by some system-related occurrence
- Traffic events

Anonymized Database Dumps

To troubleshoot customer-reported issues, Illumio Customer Support sometimes requests that you supply an anonymized dump of the PCE database.

To safeguard your organization's privacy, the event information is not included in the anonymized database dump.

REST API Events Schema

The Events schema in JSON is downloadable from this documentation portal in the zipfile of the REST API schemas. From the documentation portal Home page, go to the **Develop** category > **REST API Public Schemas (Archive File)**.

Event Syntax

The names of recorded auditable events in have the following general syntax:

```
resource.verb[.success_or_failure]
```

Where:

- `resource` is a PCE and VEN object, such as PCE `user` or VEN `agent` component.

- `verb` describes the action of the event on that resource.
- In CEF and LEEF formats, the success or failure of the verb is included in the recorded event type. This indicator is not needed in the JSON format.

Events Record Information

The following information is included in a event record, which answers the who, what, where, how, and when:

Type of information	Description
Who	• VEN identified by hostname and agent href, and after Release 22.3, VEN href • User identified by username and href • PCE system identified by "system"

What	The action that triggered the event, including the following data:
	
	• Resource type + operation + success or failure
	• Application Request ID
	• Status of successful events and failed events:
	  • In case of failure, exception type and exception message.
	  • All failures related to security, such as authentication and authorization.
	  • Severity as INFO, WARNING, ERROR.
	• The pre-change and post-change values of the affected resources.

Where	The target resource of the action, composed of the following data:
	
	• Identifier of the target resource (primary field).
	• Friendly name for the target resource. For example:
	  • workload/VEN: `hostname`
	  • user.username
	  • ruleset, label, service, etc: name, key/value

How	API endpoint, method, HTTP status code, and source IP address of the request.
When	Timestamp of the event's occurrence. This timestamp is *not* the time the event was recorded.

Event Record Structure

Regardless of export format (JSON, CEF, or LEEF), the records and fields for all events share a common structure. This common structure of composite events makes post-processing of event data easier.

Bulk change operations on many resources simultaneously are recorded as individual operations on the resource within a single composite event. Failed attempts to change a configuration, such as incorrect authentication, are also collected.

Common Fields

Field Name	Description
`href`	Unique event identifier; contains a UUID.
`timestamp`	Exact time that the event occurred in RFC 3339 format with fractional seconds.
`pce_fqdn`	The fully qualified domain name of the PCE; especially useful for Supercluster deployments or if there are multiple PCEs sending data to the SIEM server.
`created_by`	Identifies creator of the event; could be a user, the system, or a workload.
`event_type`	Name of the event; for more information, see the List of Event Types [318] table.
`status`	"Success" or "failure;" if the status is null, the event is for information only and doesn't indicate success or failure.
`severity`	"Informational," "warning," or "error" indicating the severity of the event.
`version`	Schema version for events.

Events Displayed in PCE Web Console

The PCE web console provides an ongoing log of all Organization events that occur in the PCE. For example, Organization events capture actions such as users logging in and logging out, and failed login attempts; when a system object is created, modified, deleted, or provisioned; when a workload is paired or unpaired; and so on.

From the platform and API perspective, Organization events are referred to internally as `auditable_events` and are generated by the `auditable_events_service`.

You can use the filter at the top of the page to search for events by type of event, event severity level, and when the event occurred.

Cross-Site Request Forgery Protection

A cross-site request forgery (CSRF) is an attack that involves forcing a victim to send an HTTP request to a target destination without their knowledge or intent in order to perform an action as the victim. The underlying cause is an application functionality using predictable URL or form actions in a repeatable way. The nature of the attack is that CSRF exploits the trust that a website has for a user.

For more details on this attack, see the CSRF article on the Web Application Security Consortium website.

Illumio Core can notify you of this type of attack in the following ways:

- The PCE web console logs the attack as an Organization Event called "CSRF token validation failure."
- The event is logged in the Illumio Core REST API as `authz_csrf_validation_failure` in the `audit_log_events_get.schema`.
- The event `authz_csrf_validation_failure` appears in the PCE syslog output if you have deployed the PCE as a software.

IMPORTANT

When you see this event occur, you should immediately investigate the issue because the request might not have originated from a valid user.

List of Event Types

The following table provides the types of JSON events generated and their description. For each of these events, the CEF/LEEF success or failure events generated are the event name followed by `.success` or `.failure`.

For example, the CEF/LEEF success event for `agent.activate` is `agent.activate.success` and the failure event is `agent.activate.failure`.

Each event can generate a variety of notification messages. See Notification Messages in Events [329].

JSON Event Type	Description
access_restriction.create	Access restriction created
access_restriction.delete	Access restriction deleted
access_restriction.update	Access restriction updated
agent.activate	Agent paired
agent.activate_clone	Agent clone activated
agent.clone_detected	Agent clone detected
agent.deactivate	Agent unpaired
agent.generate_maintenance_token	Generate maintenance token for any agent
agent.goodbye	Agent disconnected
agent.machine_identifier	Agent machine identifiers updated
agent.refresh_token	Agent refreshed token
agent.reguest_policy	Policy request sent
agent.request_upgrade	VEN upgrade request sent
agent.service_not_available	Agent reported a service not running
agent.suspend	Agent suspended
agent.tampering	Agent firewall tampered
agent.unsuspend	Agent unsuspended
agent.update	Agent properties updated.
agent.update_interactive_users	Agent interactive users updated
agent.update_iptables_href	Agent updated existing iptables href
agent.update_running_containers	Agent updated existing containers
agent.upload_existing_ip_table_rules	Agent existing IP tables uploaded
agent.upload_support_report	Agent support report uploaded
agent_support_report_request.create	Agent support report request created
agent_support_report_request.delete	Agent support report request deleted
agents.clear_conditions	Condition cleared from a list of VENs
agents.unpair	Multiple agents unpaired
api_key.create	API key created

JSON Event Type	Description
api_key.delete	API key deleted
api_key.update	API key updated
auth_security_principal.create	RBAC auth security principal created
auth_security_principal.delete	RBAC auth security principal deleted
auth_security_principal.update	RBAC auth security principal updated
authentication_settings.update	Authentication settings updated
cluster.create	PCE cluster created
cluster.delete	PCE cluster deleted
cluster.update	PCE cluster updated
container_workload.update	Container workload updated
container_cluster.create	Container cluster created
container_cluster.delete	Container cluster deleted
container_cluster.update	Container cluster updated
container_cluster.update_label_map	Container cluster label mappings updated all at once
container_cluster.update_services	Container cluster services updated, created, or deleted by Kubelink
container_workload_profile.create	Container workload profile created
container_workload_profile.delete	Container workload profile deleted
container_workload_profile.update	Container workload profile updated
database.temp_table_autocleanup_started	DB temp table cleanup started
database.temp_table_autocleanup_completed	DB temp table cleanup completed
domain.create	Domain created
domain.delete	Domain deleted
domain.update	Domain updated
enforcement_boundary.create	Enforcement boundary created
enforcement_boundary.delete	Enforcement boundary deleted
enforcement_boundary.update	Enforcement boundary updated
event_settings.update	Event settings updated

JSON Event Type	Description
firewall_settings.update	Global policy settings updated
group.create	Group created
group.update	Group updated
ip_list.create	IP list created
ip_list.delete	IP list deleted
ip_list.update	IP list updated
ip_lists.delete	IP lists deleted
ip_tables_rule.create	IP tables rules created
ip_tables_rule.delete	IP tables rules deleted
ip_tables_rule.update	IP tables rules updated
job.delete	Job deleted
label.create	Label created
label.delete	Label deleted
label.update	Label updated
label_group.create	Label group created
label_group.delete	Label group deleted
label_group.update	Label group updated
labels.delete	Labels deleted
ldap_config.create	LDAP configuration created
ldap_config.delete	LDAP configuration deleted
ldap_config.update	LDAP configuration updated
ldap_config.verify_connection	LDAP server connection verified
license.delete	License deleted
license.update	License updated
login_proxy_ldap_config.create	Interservice call to login service to create LDAP config
login_proxy_ldap_config.delete	Interservice call to login service to delete LDAP config
login_proxy_ldap_config.update	Interservice call to login service to update LDAP config
login_proxy_ldap_config.verify_connection	Interservice call to login service to verify connection to the LDAP server

JSON Event Type	Description
login_proxy_msp_tenants.create	New MSP tenant created
login_proxy_msp_tenants.delete	MSP tenant deleted
login_proxy_msp_tenants.update	MSP tenant updated
login_proxy_orgs.create	New managed organization created
login_proxy_orgs.delete	Managed organization deleted
login_proxy_orgs.update	Managed organization updated
lost_agent.found	Lost agent found
network.create	Network created
network.delete	Network deleted
network.update	Network updated
network_device.ack_enforcement_instructions_applied	Enforcement instruction applied to a network device
network_device.assign_workload	Existing or new unmanaged workload assigned to a network device
network_device.create	Network device created
network_device.delete	Network device deleted
network_device.update	Network device updated
network_devices.ack_multi_enforcement_instructions_applied	Enforcement instructions applied to multiple network devices
network_endpoint.create	Network endpoint created
network_endpoint.delete	Network endpoint deleted
network_endpoint.update	Network endpoint updated
network_enforcement_node.activate	Network enforcement node activated
network_enforcement_node.clear_conditions	Network enforcement node conditions cleared
network_enforcement_node.deactivate	Network enforcement node deactivated
network_enforcement_node.degraded	Network enforcement node failed or primary lost connectivity to secondary
network_enforcement_node.missed_heartbeats	Network enforcement node did not heartbeat for more than 15 minutes
network_enforcement_node.missed_heartbeats_check	Network enforcement node missed heartbeats check

JSON Event Type	Description
network_enforcement_node.network_devices_network_endpoints_workloads	Workload added to network endpoint
network_enforcement_node.policy_ack	Network enforcement node acknowledgment of policy
network_enforcement_node.request_policy	Network enforcement node policy requested
network_enforcement_node.update_status	Network enforcement node reports when switches are not reachable
network_enforcement_nodes.clear_conditions	A condition was cleared from a list of network enforcement nodes
nfc.activate	Network function controller created
nfc.delete	Network function controller deleted
nfc.update_discovered_virtual_servers	Network function controller virtual servers discovered
nfc.update_policy_status	Network function controller policy status
nfc.update_slb_state	Network function controller SLB state updated
org.create	Organization created
org.recalc_rules	Rules for organization recalculated
org.update	Organization information updated
pairing_profile.create	Pairing profile created
pairing_profile.create_pairing_key	Pairing profile pairing key created
pairing_profile.delete	Pairing profile deleted
pairing_profile.update	Pairing profile updated
pairing_profile.delete_all_pairing_keys	Pairing keys deleted from pairing profile
pairing_profiles.delete	Pairing profiles deleted
password_policy.create	Password policy created
password_policy.delete	Password policy deleted
password_policy.update	Password policy updated
permission.create	RBAC permission created
permission.delete	RBAC permission deleted
permission.update	RBAC permission updated
radius_config.create	Create domain RADIUS configuration
radius_config.delete	Delete domain RADIUS configuration

JSON Event Type	Description
radius_config.update	Update domain RADIUS configuration
radius_config.verify_shared_secret	Verify RADIUS shared secret
request.authentication_failed	API request authentication failed
request.authorization_failed	API request authorization failed
request.internal_server_error	API request failed due to internal server error
request.service_unavailable	API request failed due to unavailable service
request.unknown_server_error	API request failed due to unknown server error
resource.create	Login resource created
resource.delete	Login resource deleted
resource.update	Login resource updated
rule_set.create	Rule set created
rule_set.delete	Rule set deleted
rule_set.update	Rule set updated
rule_sets.delete	Rule sets deleted
saml_acs.update	SAML assertion consumer services updated
saml_config.create	SAML configuration created
saml_config.delete	SAML configuration deleted
saml_config.pce_signing_cert	Generate a new cert for signing SAML AuthN requests
saml_config.update	SAML configuration updated
saml_sp_config.create	SAML Service Provider created
saml_sp_config.delete	SAML Service Provider deleted
saml_sp_config.update	SAML Service Provider updated
sec_policy.create	Security policy created
sec_policy_pending.delete	Pending security policy deleted
sec_policy.restore	Security policy restored
sec_rule.create	Security policy rules created
sec_rule.delete	Security policy rules deleted
sec_rule.update	Security policy rules updated

JSON Event Type	Description
secure_connect_gateway.create	SecureConnect gateway created
secure_connect_gateway.delete	SecureConnect gateway deleted
secure_connect_gateway.update	SecureConnect gateway updated
security_principal.create	RBAC security principal created
security_principal.delete	RBAC security principal bulk deleted
security_principal.update	RBAC security principal bulk updated
security_principals.bulk_create	RBAC security principals bulk created
service.create	Service created
service.delete	Service deleted
service.update	Service updated
service_account.create	Service account created
service_account.delete	Service account deleted
service_account.update	Service account updated
service_binding.create	Service binding created
service_binding.delete	Service binding created
service_bindings.delete	Service bindings deleted
service_bindings.delete	Service binding deleted
services.delete	Services deleted
settings.update	Explorer settings updated
slb.create	Server load balancer created
slb.delete	Server load balancer deleted
slb.update	Server load balancer updated
support_report.upload	Support report uploaded
syslog_destination.create	syslog remote destination created
syslog_destination.delete	syslog remote destination deleted
syslog_destination.update	syslog remote destination updated
system_task.agent_missed_heart-beats_check	Agent missed heartbeats

JSON Event Type	Description
system_task.agent_missing_heartbeats_after_upgrade	VEN missing heartbeat after upgrade
system_task.agent_offline_check	Agents marked offline
system_task.agent_self_signed_certs_check	VEN self signed certificate housekeeping check
system_task.agent_settings_invalidation_error_state_check	VEN settings invalidation error state check
system_task.agent_uninstall_timeout	VEN uninstall timeout
system_task.clear_auth_recover_condition	Clear VEN authentication recovery condition
system_task.compute_policy_for_unmanaged_workloads	Compute policy for unmanaged workloads
system_task.delete_expired_service_account_api_keys	An expired service account api_key was successfully deleted
system_task.delete_old_cached_perspectives	Delete old cached perspectives
system_task.endpoint_offline_check	Endpoint marked offline
system_task.provision_container_cluster_services	Container cluster services provisioned
system_task.prune_old_log_events	Event pruning completed
system_task.remove_stale_zone_subsets	Stale zone subnets removed
system_task.set_server_sync_check	Set server synced
system_task.vacuum_deactivated_agent_and_deleted_workloads	Deactivated and deleted workloads have been vacuumed
traffic_collector_setting.create	Traffic collector setting created
traffic_collector_setting.delete	Traffic collector setting deleted
traffic_collector_setting.update	Traffic collector setting updated
trusted_proxy_ips.update	Trusted proxy IPs created or updated
user.accept_invitation	User invitation accepted
user.authenticate	User authenticated
user.create	User created
user.delete	User deleted
user.invite	User invited
user.login	User logged in

JSON Event Type	Description
user.login_session_terminated	User login session terminated
user.logout	User logged
user.pce_session_terminated	User session terminated
user.reset_password	User password reset
user.sign_in	User session created
user.sign_out	User session terminated
user.update	User information updated
user.update_password	User password updated
user.use_expired_password	User entered expired password
user.verify_mfa	User verified MFA
users.auth_token	Auth token returned for user authentication on PCE
user_local_profile.create	User local profile created
user_local_profile.delete	User local profile deleted
user_local_profile.reinvite	User local profile reinvited
user_local_profile.update_password	User local password updated
ven_settings.update	VEN settings updated
ven_software.upgrade	VEN software release upgraded
ven_software_release.create	VEN software release created
ven_software_release.delete	VEN software release deleted
ven_software_release.deploy	VEN software release deployed
ven_software_release.update	VEN software release updated
ven_software_releases.set_default_version	Default VEN software version set
virtual_server.create	Virtual server created
virtual_server.delete	Virtual server created
virtual_server.update	Virtual server updated
virtual_service.create	Virtual service created
virtual_service.delete	Virtual service deleted
virtual_service.update	Virtual service updated

JSON Event Type	Description
`virtual_services.bulk_create`	Virtual services created in bulk
`virtual_services.bulk_update`	Virtual services updated in bulk
`vulnerability.create`	Vulnerability record created
`vulnerability.delete`	Vulnerability record deleted
`vulnerability.update`	Vulnerability record updated
`vulnerability_report.delete`	Vulnerability report deleted
`vulnerability_report.update`	Vulnerability report updated
`workload.create`	Workload created
`workload.delete`	Workload deleted
`workload.online`	Workload online
`workload.recalc_rules`	Workload policy recalculated
`workload.redetect_network`	Workload network redetected
`workload.undelete`	Workload undeleted
`workload.update`	Workload settings updated
`workload.upgrade`	Workload upgraded
`workload_interface.create`	Workload interface created
`workload_interface.delete`	Workload interface deleted
`workload_interface.update`	Workload interface updated
`workload_interfaces.update`	Workload interfaces updated For example, IP address changes, new interface added, and interface shut down.
`workload_service_report.update`	Workload service report updated
`workload_settings.update`	Workload settings updated
`workloads.apply_policy`	Workloads policies applied
`workloads.bulk_create`	Workloads created in bulk
`workloads.bulk_delete`	Workloads deleted in bulk
`workloads.bulk_update`	Workloads updated in bulk
`workloads.remove_labels`	Workloads labels removed
`workloads.set_flow_reporting_frequency`	Workload flow reporting frequency changed

JSON Event Type	Description
workloads.set_labels	Workload labels applied
workloads.unpair	Workloads unpaired
workloads.update	Workloads updated

Notification Messages in Events

Events can generate a variety of notifications that are appended after the event type:

- agent.clone_detected
- agent.fw_state_table_threshold_exceeded
- agent.missed_heartbeats
- agent.missing_heartbeats_after_upgrade
- agent.policy_deploy_failed
- agent.policy_deploy_succeeded
- agent.process_failed
- agent.service_not_available
- agent.upgrade_requested
- agent.upgrade_successful
- agent.upgrade_time_out
- container_cluster.duplicate_machine_id
- container_cluster.region_mismatch
- container_workload.invalid_pairing_config
- container_workload.not_created
- database.temp_table_autocleanup_completed
- database.temp_table_autocleanup_started
- hard_limit.exceeded
- pce.application_started
- pce.application_stopped
- remote_syslog.reachable
- remote_syslog.unreachable
- request.authentication_failed
- request.authorization_failed
- request.internal_server_error
- request.invalid
- request.service_unavailable
- request.unknown_server_error
- sec_policy.restore
- soft_limit.exceeded
- system_task.event_pruning_completed
- system_task.hard_limit_recovery_completed
- user.csrf_validation_failed
- user.login_failed
- user.login_failure_count_exceeded
- user.login_session_created
- user.login_session_terminated
- user.pce_session_created
- user.pce_session_terminated

- `user.pw_change_failure`
- `user.pw_changed`
- `user.pw_complexity_not_met`
- `user.pw_reset_completed`
- `user.pw_reset_requested`
- `virtual_service.not_created`
- `workload.duplicate_interface_reported`
- `workload.nat_rules_present`
- `workload.offline_after_ven_goodbye`
- `workload.online`
- `workload.oob_policy_changes`
- `workload.partial_policy_delivered`
- `workload.update_mismatched_interfaces`
- `workloads.flow_reporting_frequency_updated`

Common Criteria Only Events

The following table lists the types of JSON events that are generated and their descriptions.

For each of these events, the CEF/LEEF success or failure events generated are the event name followed by `.success` or `.failure`.

For example, the CEF/LEEF success event for `agent.update` is `agent.update.success` and the failure event is `agent.update.failure`.

JSON Event Type	Description
`pce.application_started`	PCE application started
`pce.application_stopped`	PCE application stopped
`remote_syslog.reachable`	Remote syslog destination reachable
`remote_syslog.unreachable`	Remote syslog destination not reachable
`tls_channel.establish`	TLS channel established
`tls_channel.terminate`	TLS channel terminated

View and Export Events

By default, you can view events in the PCE web console or by using the PCE command line. You can then export Organization events using the PCE web console.

View Events in PCE Web Console

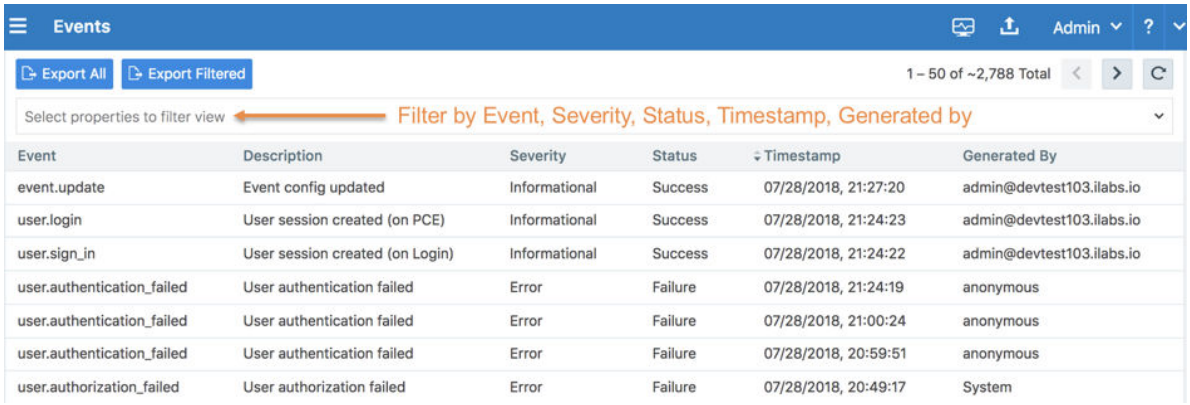
By default, the PCE web console shows events that occur in your organization, such as when a workload is paired, if a pairing failed, when a user logs in or logs out, when a user fails to authenticate, and so on.

If you want to see only certain events you can filter by event type to see events that interest you most. You can also search for Organization events by their universally unique identifier (UUID), and filter events by their severity.

You can also export the list of organization events as a CSV file.

To view Organization events:

1. From the PCE web console menu, choose **Troubleshooting** > **Events**.
2. As the top of the page, you can use the Event Filter to filter the list by event type.



NOTE

In the Events Viewer, the suggested values for the filters are generated from all possible values. For example, the “Generated By” filter shows all users on the system. However, the actual results displayed by that filter might not contain any data.

VEN Event Not Displayed in PCE Web Console

The following events related to VENs are not currently viewable in the PCE web console. This is a two-column list of event names.

VEN Events not shown in PCE Web Console	
fw_tampering_revert_failure	lost_agent
fw_tampering_reverted	missing_os_updates
fw_tampering_subsystem_failure	pce_incompat_api_version
invoke_powershell_failure	pce_incompat_version
ipsec_conn_state_change	pce_reachable
ipsec_conn_state_failure	pce_unreachable
ipsec_monitoring_failure	proc_config_failure
ipsec_monitoring_started	proc_envsetup_failure
ipsec_monitoring_stopped	proc_init_failure
ipsec_subsystem_failure	proc_malloc_failure
ipsec_subsystem_started	proc_restart_failure
ipsec_subsystem_stopped	proc_started
refresh_token_failure	proc_stopped
refresh_token_success	

VEN href Added to Events Information

After the 22.3.0 upgrade, all events created by a VEN includes the VEN href as well as the previously included Agent href. The VEN href can be used to query the VEN API, obtain the workload record, and execute various operations on the VEN from the PCE.

View Events Using PCE Command Line

Run this command at any runlevel to display:

- The total number of events
- The average number of events per day

```
sudo -u ilo-pce illumio-pce-db-management events-db events-db-show
```

Run this command at any runlevel to display:

- The amount of disk space used by events
- The total number of events

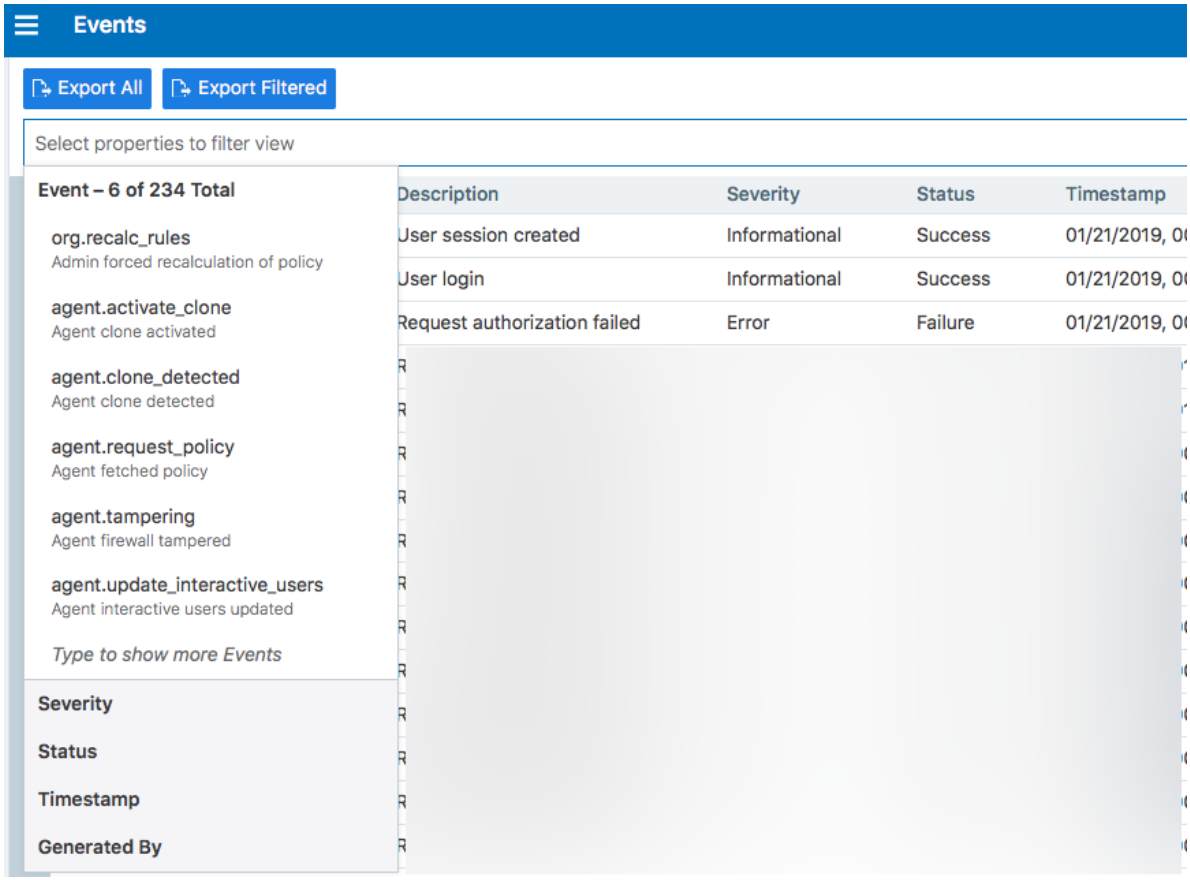
```
sudo -u ilo-pce illumio-pce-db-management events-db disk-usage-show
```

Export Events Using PCE Web Console

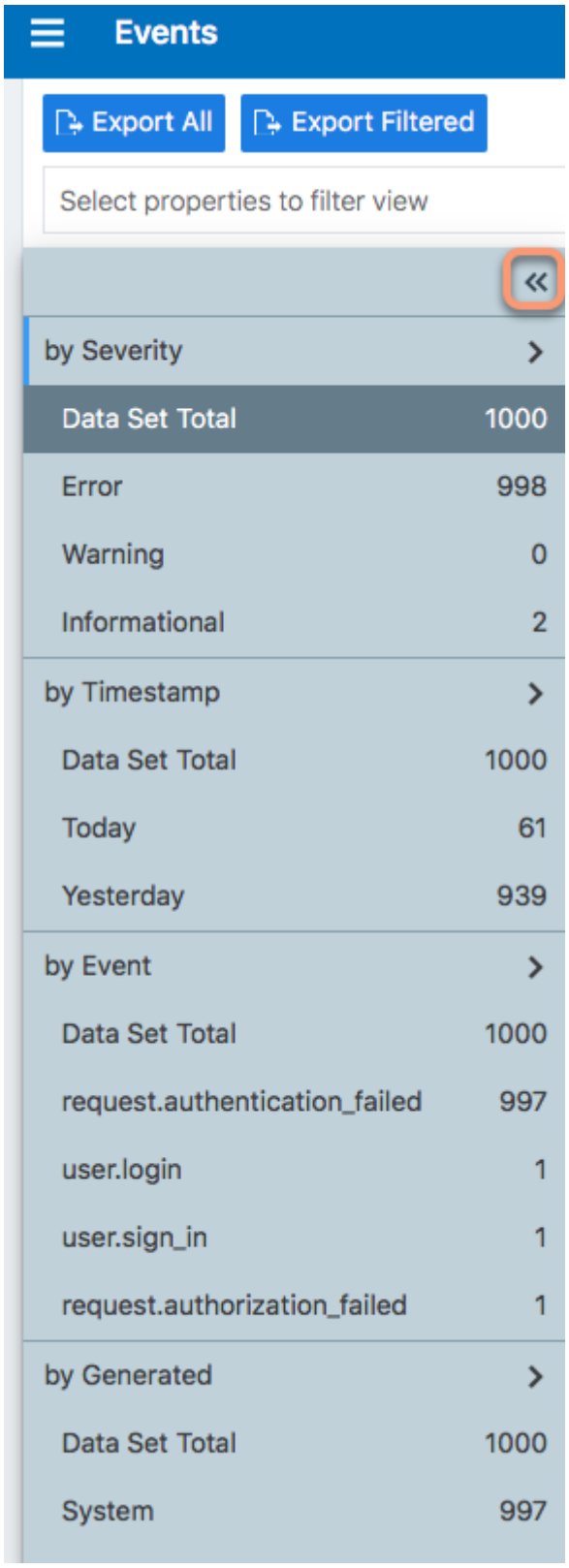
You can export all Organization events, or export a filtered list organization events to a CSV file.

To export events:

1. From the PCE web console menu, choose **Troubleshooting** > **Events**.
   You see a list of events based on the activities performed.
2. Click **Export** > **Export All** to export all Organization events.
3. To export a filtered list of a events, filter the list and then click **Export** > **Export Filtered** to export only the filtered view.
4. To search for events based on event type, severity, status, timestamp, and who generated them, use the search filter:



5. For a faster filtering via the browser, use the following field:



Examples of Events

This section presents examples of recorded events in JSON, CEF, and LEEF for various auditing needs.

User Password Update Failed (JSON)

This example event shows a user password change that failed validation. Event type `user.update_password` shows `"status": "failure"`, and the notification shows that the user's attempted new password did not meet complexity requirements.


```
{
        "href": "/orgs/1/events/xxxxxxxx-39bd-43f1-a680-cc17c6984925",
        "timestamp": "2018-08-29T22:07:00.978Z",
        "pce_fqdn": "pce1.bigco.com",
        "created_by": {
               "system": {}
        },
        "event_type": "user.update_password",
        "status": "failure",
        "severity": "info",
        "action": {
               "uuid": "xxxxxxxx-a5f7-4975-a2a5-b4dbd8b74493",
               "api_endpoint": "/login/users/password/update",
               "api_method": "PUT",
               "http_status_code": 302,
               "src_ip": "10.3.6.116"
        },
        "resource_changes": [],
        "notifications": [{
               "uuid": "xxxxxxxx-7b8e-4205-a62a-1f070d8a0ee2",
               "notification_type": "user.pw_complexity_not_met",
               "info": null
        }, {
               "uuid": "xxxxxxxx-9721-4971-b613-d15aa67a4ee7",
               "notification_type": "user.pw_change_failure",
               "info": {
                      "reason": "Password must have minimum of 1 new
character(s)"
               }
        }],
        "version": 2
}
```


Resource Updated (JSON)

This example shows the before and after values of a successful update event `rule_set.update`. The name of the ruleset changed from `"before": "rule_set_2"` to `"after": "rule_set_3"`.


```
{ "href": "/orgs/1/events/xxxxxxxx-8033-4f1a-83e9-fde57c425807",
"timestamp": "2018-08-29T22:04:04.733Z",
"pce_fqdn": "pce1.bigco.com",
"created_by": {
"user": {
"href": "/users/1",
"username": "albert.einstein@bigco.com"
}
},
"event_type": "rule_set.update",
"status": "success",
```

```
"severity": "info",
"action": {
"uuid": "xxxxxxxx-7488-480b-9ef9-0cd2a8496004",
"api_endpoint": "/api/v2/orgs/1/sec_policy/draft/rule_sets/6",
"api_method": "PUT",
"http_status_code": 204,
"src_ip": "10.3.6.116"
},
"resource_changes": [{
"uuid": "xxxxxxxx-1d13-4e5e-8f0b-e0e8bccc44e0",
"resource": {
"rule_set": {
"href": "/orgs/1/sec_policy/draft/rule_sets/6",
"name": "rule_set_3",
"scopes": [
[{
"label": {
"href": "/orgs/1/labels/19",
"key": "app",
"value": "app2"
}
}, {
"label": {
"href": "/orgs/1/labels/20",
"key": "env",
"value": "env2"
}
}, {
"label": {
"href": "/orgs/1/labels/21",
"key": "loc",
"value": "loc2"
}
}]
]
}
},
"changes": {
"name": {
"before": "rule_set_2",
"after": "rule_set_3"
}
},
"change_type": "update"
}],
"notifications": [],
"version": 2
}
```


Security Rule Created (JSON)

In this example of a successful `sec_rule` composite event, a new security rule is created. Because this is a creation event, the `before` values are `null`.


```
{ "href": "/orgs/1/events/xxxxxxxx-6d29-4905-ad32-ee863fb63697",
"timestamp": "2018-08-29T21:48:28.954Z",
```

```
"pce_fqdn": "pce24.bigco.com",
"created_by": {
"user": {
"href": "/users/1",
"username": "albert.einstein@bigco.com"
}
},
"event_type": "sec_rule.create",
"status": "success",
"severity": "info",
"action": {
"uuid": "xxxxxxxx-165b-4e06-aaac-60e4d8b0b9a0",
"api_endpoint": "/api/v2/orgs/1/sec_policy/draft/rule_sets/1/sec_rules",
"api_method": "POST",
"http_status_code": 201,
"src_ip": "10.6.1.156"
},
"resource_changes": [{
"uuid": "9fcf6feb-bf25-4de8-a68a-a50598df4cf6",
"resource": {
"sec_rule": {
"href": "/orgs/1/sec_policy/draft/rule_sets/1/sec_rules/5"
}
},
"changes": {
"rule_list": {
"before": null,
"after": {
"href": "/orgs/1/sec_policy/draft/rule_sets/1"
}
},
"description": {
"before": null,
"after": "WinRM HTTP/HTTPS and RDP"
},
"type": {
"before": null,
"after": "SecRule"
},
"resolve_labels": {
"before": null,
"after": "1010"
},
"providers": {
"created": [{
"provider": true,
"actors": "ams"
}]
},
"consumers": {
"created": [{
"provider": false,
"actors": "ams"
}, {
"provider": false,
```

```
"ip_list": {
"href": "/orgs/1/sec_policy/draft/ip_lists/1"
}
}]
},
"ingress_services": {
"created": [{
"href": "/orgs/1/sec_policy/draft/services/7",
"name": "WinRM HTTP/HTTPS and RDP"
}]
}
},
"change_type": "create"
}],
"notifications": [],
"version": 2
}
```


User Logged In (JSON)


```
[
{
  "href": "/orgs/1/events/xxxxxxxx-xxxx-xxxx-xxxx-xxxxxxxxxxxx",
  "timestamp": "2019-06-25T23:34:12.948Z",
  "pce_fqdn": "someFullyQualifiedDomainName",
  "created_by": {
    "user": {
      "href": "/users/1",
      "username": "someUser@someDomain"
    }
  },
  "event_type": "user.sign_in",
  "status": "success",
  "severity": "info",
  "action": {
    "uuid": "xxxxxxxx-xxxx-xxxx-xxxx-xxxxxxxxxxxx",
    "api_endpoint": "/login/users/sign_in",
    "api_method": "POST",
    "http_status_code": 302,
    "src_ip": "xxx.xxx.xx.x"
  },
  "resource_changes": [
    {
      "uuid": "xxxxxxxx-xxxx-xxxx-xxxx-xxxxxxxxxxxx",
      "resource": {
        "user": {
          "href": "/users/1",
          "type": "local",
          "username": "someUser@someDomain"
        }
      },
      "changes": {
        "sign_in_count": {
          "before": 4,
          "after": 5
        }
```

```
      },
      "change_type": "update"
    }
  ],
  "notifications": [
    {
      "uuid": "xxxxxxxx-xxxx-xxxx-xxxx-xxxxxxxxxxxx",
      "notification_type": "user.login_session_created",
      "info": {
        "user": {
          "href": "/users/1",
          "type": "local",
          "username": "someUser@someDomain"
        }
      }
    }
  ]
},
{
  "href": "/orgs/1/events/xxxxxxxx-xxxx-xxxx-xxxx-xxxxxxxxxxxx",
  "timestamp": "2019-06-25T23:34:15.147Z",
  "pce_fqdn": "someFullyQualifiedDomainName",
  "created_by": {
    "user": {
      "href": "/users/1",
      "username": "someUser@someDomain"
    }
  },
  "event_type": "user.login",
  "status": "success",
  "severity": "info",
  "action": {
    "uuid": "xxxxxxxx-xxxx-xxxx-xxxx-xxxxxxxxxxxx",
    "api_endpoint": "/api/v2/users/login",
    "api_method": "GET",
    "http_status_code": 200,
    "src_ip": "xxx.xxx.xx.x"
  },
  "resource_changes": [

  ],
  "notifications": [
    {
      "uuid": "xxxxxxxx-xxxx-xxxx-xxxx-xxxxxxxxxxxx",
      "notification_type": "user.pce_session_created",
      "info": {
        "user": {
          "href": "/users/1",
          "username": "someUser@someDomain"
        }
      }
    }
  ]
}
]
```

User Logged Out (JSON)


```
[
{
  "href": "/orgs/1/events/xxxxxxxx-xxxx-xxxx-xxxx-xxxxxxxxxxxx",
  "timestamp": "2019-06-25T23:35:16.636Z",
  "pce_fqdn": "someFullyQualifiedDomainName",
  "created_by": {
    "user": {
      "href": "/users/1",
      "username": "someUser@someDomain"
    }
  },
  "event_type": "user.sign_out",
  "status": "success",
  "severity": "info",
  "action": {
    "uuid": "xxxxxxxx-xxxx-xxxx-xxxx-xxxxxxxxxxxx",
    "api_endpoint": "/login/logout",
    "api_method": "GET",
    "http_status_code": 302,
    "src_ip": "xxx.xxx.xx.x"
  },
  "resource_changes": [

  ],
  "notifications": [
    {
      "uuid": "xxxxxxxx-xxxx-xxxx-xxxx-xxxxxxxxxxxx",
      "notification_type": "user.login_session_terminated",
      "info": {
        "reason": "user_logout",
        "user": {
          "href": "/users/1",
          "username": "someUser@someDomain"
        }
      }
    }
  ]
},
{
  "href": "/orgs/1/events/xxxxxxxx-xxxx-xxxx-xxxx-xxxxxxxxxxxx",
  "timestamp": "2019-06-25T23:35:16.636Z",
  "pce_fqdn": "someFullyQualifiedDomainName",
  "created_by": {
    "user": {
      "href": "/users/1",
      "username": "someUser@someDomain"
    }
  },
  "event_type": "user.sign_out",
  "status": "success",
  "severity": "info",
  "action": {
    "uuid": "xxxxxxxx-xxxx-xxxx-xxxx-xxxxxxxxxxxx",
```

```
    "api_endpoint": "/login/logout",
    "api_method": "GET",
    "http_status_code": 302,
    "src_ip": "xxx.xxx.xx.x"
  },
  "resource_changes": [

  ],
  "notifications": [
    {
      "uuid": "xxxxxxxx-xxxx-xxxx-xxxx-xxxxxxxxxxxx",
      "notification_type": "user.login_session_terminated",
      "info": {
        "reason": "user_logout",
        "user": {
          "href": "/users/1",
          "username": "someUser@someDomain"
        }
      }
    }
  ]
}
]
```


Login Failed — Incorrect Username (JSON)


```
{
  "href": "/orgs/1/events/xxxxxxxx-xxxx-xxxx-xxxx-xxxxxxxxxxxx",
  "timestamp": "2019-06-25T23:35:41.560Z",
  "pce_fqdn": "someFullyQualifiedDomainName",
  "created_by": {
    "system": {
    }
  },
  "event_type": "user.sign_in",
  "status": "failure",
  "severity": "info",
  "action": {
    "uuid": "someFullyQualifiedDomainName",
    "api_endpoint": "/login/users/sign_in",
    "api_method": "POST",
    "http_status_code": 200,
    "src_ip": "xxx.xxx.xx.x"
  },
  "resource_changes": [

  ],
  "notifications": [
    {
      "uuid": "xxxxxxxx-xxxx-xxxx-xxxx-xxxxxxxxxxxx",
      "notification_type": "user.login_failed",
      "info": {
        "associated_user": {
          "supplied_username": "invalid_username@someDomain"
        }
      }
```

```
    }
  ]
}
```

Login Failed — Incorrect Password (JSON)

```
{
  "href": "/orgs/1/events/xxxxxxxx-xxxx-xxxx-xxxx-xxxxxxxxxxxx",
  "timestamp": "2019-06-25T23:35:27.649Z",
  "pce_fqdn": "someFullyQualifiedDomainName",
  "created_by": {
    "system": {
    }
  },
  "event_type": "user.sign_in",
  "status": "failure",
  "severity": "info",
  "action": {
    "uuid": "xxxxxxxx-xxxx-xxxx-xxxx-xxxxxxxxxxxx",
    "api_endpoint": "/login/users/sign_in",
    "api_method": "POST",
    "http_status_code": 200,
    "src_ip": "xxx.xxx.xx.x"
  },
  "resource_changes": [

  ],
  "notifications": [
    {
      "uuid": "xxxxxxxx-xxxx-xxxx-xxxx-xxxxxxxxxxxx",
      "notification_type": "user.login_failed",
      "info": {
        "associated_user": {
          "supplied_username": "someUser@someDomain"
        }
      }
    }
  ]
}
```

User Log Out (CEF)

This example of an event record in CEF shows a successful user log out.

```
CEF:0|Illumio|PCE|19.3.0|user.logout.success|User Logout Success|1|rt=Mar
06 2020
18:38:59.900 +0000 dvchost=mypce.com duser=system dst=10.6.5.4
outcome=success
cat=audit_events request=/api/v2/users/logout_from_jwt requestMethod=POST
reason=204
 cs2= cs2Label=resource_changes
cs4=[{"uuid":"b5ba8bf0-7ca8-47fc-870f-6c61ddc1648d",
"notification_type":"user.pce_session_terminated","info":
{"reason":"user_logout",
"user":{"href":"/users/1","username":"testuser@mypce.com"}}}]
cs4Label=notifications
```

```
cn2=2 cn2Label=schema-version cs1Label=event_href cs1=/system_events/
e97bd255-4316-4b5e-a885-5b937f756f17
```

Workload Security Policy Updated (LEEF)

This example of an event record in LEEF shows a successful update of security policy for a workload's Ethernet interfaces.

```
LEEF:2.0|Illumio|PCE|18.2.0|interface_status.update.success|
src=xx.xxx.xxx.xxx
cat=organizational devTime=someUTCdatetime devTimeFormat=yyyy-mm-
dd'T'HH:mm:ss.ttttttZ
sev=1
usrName=albert.einstein url=/orgs/7/agents/someUUID version=2
pce_fqdn=someFQDN
created_by={"agent":{"href":"/orgs/7/agents/
someUUID","hostname":"someHostname"}}
action={"uuid":"someUUID",
"api_endpoint":"/api/v6/orgs/7/agents/xxxxxx/interface_statuses/update",
"api_method":"PUT","http_status_code":200,"src_ip":"someIP"}
resource_changes=[{"uuid":"someUUID",
"resource":{"workload":{"href":"/orgs/7/workloads/someUUID","name":null,
"hostname":"someHostname",
"labels":[{"href":"/orgs/7/labels/
xxxxxx","key":"loc","value":"test_place_1"},
{"href":"/orgs/7/labels/xxxxxx","key":"env","value":"test_env_1"},
{"href":"/orgs/7/labels/xxxxxx","key":"app","value":"test_app_1"},
{"href":"/orgs/7/labels/xxxxxx","key":"role","value":"test_access_1"}]}},
"changes":{"workload_interfaces":
{"updated":[{"resource":
{"href":"/orgs/7/workloads/someUUID/interfaces/eth1","name":"eth0","
address":{"family":2,"addr":xxxxxxxxx,"mask_addr":someMask}},
"changes":{"address":{"before":null,"after":
{"family":2,"addr":xxxxxxxxx,"mask_addr":someMask}},
"cidr_block":{"before":null,"after":16},"default_gateway_address":
{"before":null,"after":
{"family":2,"addr":someGateway,"mask_addr":someMask}},
"link_state":{"before":"unknown","after":"up"},
"network":{"before":null,"after":{"href":"/orgs/7/networks/xx"}},
"network_detection_mode":{"before":null,"after":"single_private_brn"}}},
{"resource":{"href":"/orgs/7/workloads/someUUID/interfaces/eth1",
"name":"eth1","address":
{"family":2,"addr":someAddress,"mask_addr":someMask}},
"changes":{"address":{"before":null,"after":{"family":2,"addr":someAddress,
"mask_addr":someMask}},
"cidr_block":{"before":null,"after":16},"link_state":
{"before":"unknown","after":"up"},
"network":{"before":null,"after":{"href":"/orgs/7/networks/xx"}},
"network_detection_mode":{"before":null,"after":"single_private_brn"}}}]}},
"change_type":"update"}] notifications=[] event_href=/orgs/7/events/someUUID
```

Differences from Previous Releases

The following table indicates which event names changed in the Illumio Core 18.2 release. If you are upgrading from a release prior to 18.2, be sure to use the current event name in your alert monitoring system.

Changed VEN Event Names

This table lists the names of VEN-related events prior to the Illumio Core 18.2 release and the names they were changed to in the 18.2 release.

Old Name Prior to 18.2	New Name as of 18.2
`fw_config_change`	`agent.firewall_config`
`activation_success`	`agent.activate`
`activation_failure`	
`deactivation_success`	`agent.deactivate`
`deactivation_failure`	

Events Monitoring Best Practices

The Illumio Core generates a rich stream of structured messages that provide the following information:

- Illumio PCE system health
- Illumio PCE notable activity
- Illumio VEN notable activity

Illumio Core events are structured and actionable. Using the event data, you can identify the severity, affected systems, and what triggered the event. Illumio Core sends the structured messages using the syslog protocol to remote systems, such as Splunk and QRadar. You can set up your remote systems to automatically process the messages and alert you.

Monitoring Operational Practices

In addition to setting up an automated system, Illumio recommends implementing the following operational practices:

1. Determine the normal quantity of events from the Illumio Core and monitor the trend for changes; investigate spikes or reductions in the event generation rate.
2. Implement good operational practices to troubleshoot and investigate alerts, and to recover from events.
3. Do not monitor Illumio Core events in isolation. Monitor them as part of your overall system. Understanding the events in the context of your overall system activity can provide as much information as the events themselves.

Recommended Events to Monitor

As a best practice, Illumio recommendations you monitor the following events at a minimum.

Events	Description
Program name = `Illumio_pce/system_health` Severity = Warning, Error, or Fatal	Provides multiple systems metrics, such as CPU and memory data, for each node in a PCE cluster. The PCE generates these events every minute. The Severity field is particularly important. When system metrics exceed thresholds, the severity changes to warning, error, or fatal. For more information about the metrics and thresholds, see the PCE Administration Guide. **Recommendation:** Monitor `system_health` messages with a severity of warning or higher and correlate the event with other operational monitoring tools to determine if administrative intervention is required.

`event_type="lost_agent.found"`	Contains the information necessary to identify workloads with lost agents. A lost agent occurs when the PCE deletes a workload from its database but that workload still has a VEN running on it.
	
	Recommendation: Monitor `lost_agent.found` events and send alerts in case you need to pair the workloads' VENs with the PCE again.
	
	The property "managed" was added to the following APIs:
	
	`GET /api/v2/orgs/:xorg_id/workloads`
	
	`GET /api/v2/orgs/:xorg_id/workloads/:id`
	
	`GET /api/v2/orgs/:xorg_id/vens`
	
	`GET /api/v2/orgs/:xorg_id/vens/:id`
	
	This property allows customers to easily filter out managed versus unmanaged workloads.
	
	Possible values: 0 or 1

`event_type="system_task.agent_missed_heartbeats_check"`	Lists the VENs that missed three heartbeats (usually 15 minutes). Typically, this event precedes the PCE taking the VENs offline to perform internal maintenance. This event triggers an alert to be sent at 25% of the time configured in the offline timer. For example, if the offline timer is configured to 1 hour, an alert is sent after the VEN has not sent a heartbeat for 15 minutes; if the offline timer is configured to 4 hours, an alert is sent after the VEN hasn't sent a heartbeat for 1 hour. **Recommendation:** Monitor these events for high-value workloads because the PCE can take these workloads offline when the VENs miss 12 heartbeats (usually 60 minutes).
`event_type="system_task.agent_offline_check"`	Lists VENs that the PCE has marked offline, usually because they missed 12 heartbeats. The VENs on these workloads haven't communicated with the PCE for an hour and it removed the workloads from policy. **Recommendation:** Monitor these events for high-value workloads because they indicate change in the affected workloads' security posture.
`event_type="agent.suspend"`	Indicates that the VEN is suspended and no longer protecting the workload. If you did not intentionally run the VEN suspend command on the workload, this event can indicate the workload is under attack.

Events	Description
	Recommendation: Monitor these events for high-value workloads.
`event_type="agent.tampering"`	Indicates tampering of the workload's Illumio managed firewall and that the VEN recovered the firewall. Firewall tampering is one of the first signs that a workload is compromised. During a tampering attempt, the VEN and PCE continue to protect the workload; however, you should investigate the cause of the event. **Recommendation:** Monitor these events for high-value workloads.
`event_type="agent.update"`	Contains the state data that the VEN regularly sends to the PCE. Typically, these events contain routine information; however, the VEN can attach a notice indicating the following issues: • Processes not running • Policy deployment failure **Recommendation:** Monitor `agent.update` events that include notifications because they indicate workloads that might require administrative intervention.

`event_type="rule_set.create"`
 	
`event_type="rule_set.update"`
 	
`event_type="rule_sets.delete"`
	Contains the labels indicating the scope of a draft ruleset. Illumio Core generates these events when you create, update, or delete a draft ruleset. When you include "All Applications," "All Environments," or "All Locations" in a ruleset scope, the PCE represents that label type as a null HREF. Ruleset scopes that are overly broad affect a large number of workloads. Draft rulesets do not take effect until they are provisioned.
	
	Recommendation: Monitor these events to pinpoint ruleset scopes that are unintentionally overly broad.

`event_type="sec_rule.create"`
 	
`event_type="sec_rule.update"`
 	
`event_type="sec_rule.delete"`
	Contains labels indicating when all workloads affected, all services, or a label/label-group are used as a rule provider or consumer. Illumio Core generates these events when you create, update, or delete a draft ruleset. The removed or added labels could represent high-value applications or environments.
	
	Recommendation: Monitor these events for high-value labels.

`event_type="sec_policy.create"`	**[NEW in Illumio** Core **19.3.0]** Contains the `workloads_affected` field, which includes the number of workloads affected by a policy. Illumio Core generates this event when you provision draft policy that updates the policy on affected workloads. The number of affected workloads could be high or a significant percentage of your managed workloads. **Recommendation:** Monitor the `workloads_affected` field for a high number of affect workloads. If the number exceeds an acceptable threshold, investigate the associated the policy.
`event_type="agent.clone_detected"`	The PCE detects cloned VENs based on clone token mismatch. This is a special alert from the Illumio Core release 19.3.2 onwards, as clones have become a higher priority. Volume of these events make the severity level important and not the fact that these events occurred. **Recommendation:** If severity is 1 or 'error', some intervention may be needed.
	NOTE **Automatic Cloned VEN Remediation** For on-prem domain joined Windows workloads, cloned VENs support automatic clone remediation by detect-

Events	Description
	ing changes to the workload's domain Security identifier (SID). After the VEN reports such changes to the PCE, the PCE tells the clone to re-activate itself, after which the cloned VEN is remediated and becomes a distinct agent from the original VEN.

Events Setup

This section describes PCE settings related to events and how to use them to configure PCE behavior.

Requirements for Events Framework

To use the events framework, ensure that you allocate enough disk space for event data, and be familiar with the disk capacity requirements.

Database Sizing for Events

Disk space for a single event is estimated at an average 1,500 bytes.

> ⚠ **CAUTION**
> As the number of events increases, the increase in disk space is not a straight line. The projections below are rough estimates. Disk usage can vary in production and depends on the type of messages stored.

Number of Events	Disk Space
25 million	38GB
50 million	58GB

Data and Disk Capacity for Events

For Illumio Core Cloud customers, Illumio Operations manages all data and disk capacity requirements and configuration for events; including the default events data retention period, database dumps with and without events data, and disk compacting.

For more information, contact your Illumio Support representative.

Events Preview Runtime Setting

If you participated in the preview of Events in 18.1.0, the preview was enabled by configuring a setting in your PCE `runtime_env.yml` file.

WARNING

Remove preview parameter from runtime_env.yml

Before you upgrade to the latest release, you must remove `v2_auditable_events_recording_enabled: true` from `runtime_env.yml`. Otherwise, the upgrade does not succeed.

Removing this preview parameter does not affect the collection of "organization events" records, which continue to be recorded.

To remove the Events preview setting:

1. Edit the `runtime_env.yml` file and remove the line `v2_auditable_events_recording_enabled` :

   ```
   v2_auditable_events_recording_enabled: true
   ```

   If you are not participating in any other previews, you can also remove the line `enable_preview_features`.
2. Save your changes.

Events Settings

The following section describes how to configure the Events Settings in the PCE web console.

Events Are Always Enabled

Events are enabled by default in the PCE and cannot be disabled, in accordance with Common Criteria compliance.

Use the PCE web console to change event-related settings and the PCE `runtime_env.yml` for traffic flow summaries.

Event Settings in PCE Web Console

From the PCE web console, you can change the following event-related settings:

- **Event Severity:** Sets the severity level of events to record. Only messages at the set severity level and higher are recorded. The default severity is "Informational."
- **Retention Period:** The system retains event records for a specified number of days; from 1 day to 200 days with the default period being 30 days.
- **Event Pruning:** The system automatically prunes events based on disk usage and the age of events; events older than the retention period are pruned. When pruning is complete, the `system_task.prune_old_log_events` event is recorded.
- **Event Format:** Sets the message output to one of the three formats. The selected message output format only applies to messages that are sent over syslog to a SIEM. The REST API always returns events in JSON.

- JavaScript Object Notation (JSON): The default; accepted by Splunk and QRadar SIEMs
- Common Event Format (CEF): Accepted by ArcSight
- Log Event Extended Format (LEEF): Accepted by QRadar

Event Severity Levels

Severity	Description
Emergency	System is unusable
Alert	Should be corrected immediately
Critical	Critical conditions
Error	Error conditions
Warning	Might indicate that an error will occur if action is not taken
Notice	Events that are unusual, but not error conditions
Informational	Normal operational messages that require no action
Debug	Information useful to developers for debugging the application

Output Format Change

The output format can be changed in the PCE web console:

- JSON (default)
- CEF
- LEEF

Records are in JSON format until you change to one of the other formats. Then, the new events are recorded in the new format; however, the earlier events are not changed to the selected format and they remain recorded in JSON.

Set Event Retention Values

You can set the event retention values depending on the specific conditions described below.

If you are using a SIEM, such as Splunk as the primary long-term storage for events and traffic in a dynamic environment, consider setting the event retention period to 7 days. On setting it to 7 days, you can use the PCE Troubleshooting or Events Viewer to quickly troubleshoot and diagnose events. The benefit of setting 7 days is that if an issue occurs on a Friday, it can still be diagnosed on the following Monday. A large number of events are generated in a dynamic environment, which increases the data stored (disk space used), backup size, and so on. The period of 7 days provides a good balance between disk usage and the ability to troubleshoot.

NOTE

A dynamic environment is when applications and infrastructure are subject to frequent changes; for example, usage of APIs, ETL, Containers, and so on.

If you are using a SIEM in a non-dynamic environment, consider setting the event retention period to 30 days. A smaller number of events are generated, and less disk space is used in a non-dynamic environment.

If you are not using a SIEM such as Splunk and the PCE is the primary storage for the events data used for reporting, diagnosis, and troubleshooting, set the event retention period as per the organization's record retention policy, such as 30 days. If you generate quarterly reporting using events, set the event retention period to 90 days.

SIEM	Consideration	Value
Yes: Primary storage for events	If primary storage of events is not on the PCE	7 days (PCE troubleshooting) 1 day (minimum)
No: Not primary storage for events	If primary storage of events is on the PCE, consider the organization's record retention policy as well as the available disk and event growth pattern	30 days (default)
No	• If the organization's record retention is more than 30 days • If disk monitoring is not set up, it is required to set up disk monitoring	As per your record retention policy 200 days (maximum)
Not applicable	If events data is not needed for reporting or troubleshooting	1 day (minimum)

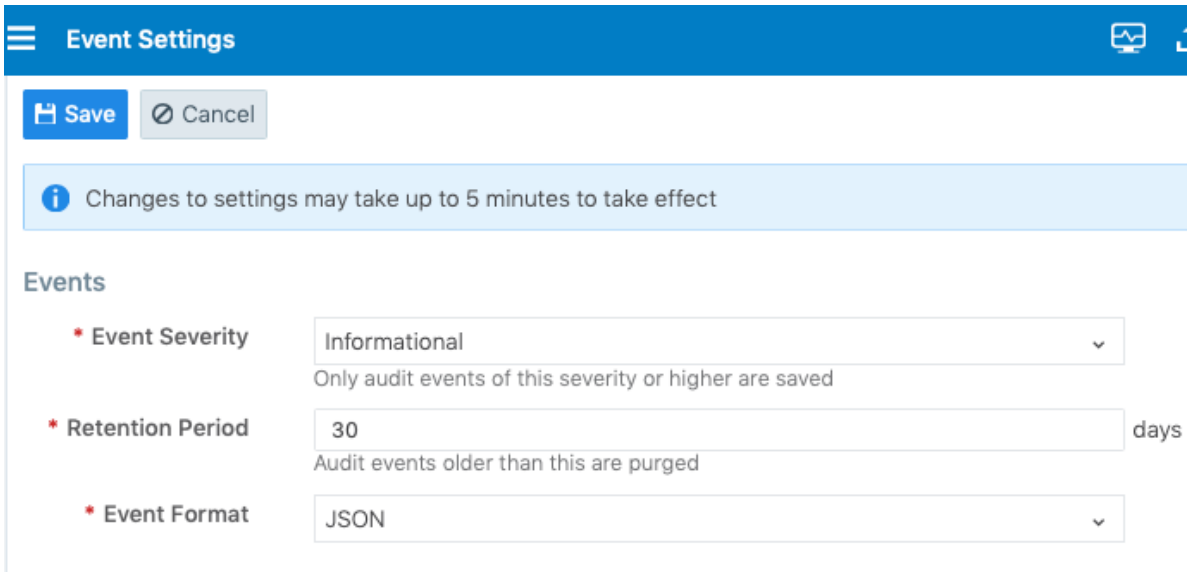
If disk space availability and event growth projections indicate that the desired retention period cannot be safely supported, consider using a SIEM because the PCE might not store events for the desired period.

NOTE

Running the `illumio-pce-db-management events-db` command provides an output of the average number of events and the storage used.

Configure Events Settings in PCE Web Console

1. From the PCE web console menu, choose **Settings** > **Event Settings** to view your current settings.
2. Click **Edit** to change the settings.
   - For Event Severity, select from the following options:
     - Error
     - Warning
     - Informational
   - For Retention Period, enter the number of days you want to retain data.
   - For Event Format, select from the following options:
     - JSON
     - CEF
     - LEEF
3. Click **Save** once you're done.



Limits on Storage

From the Illumio Core 19.3.1 release onwards, the PCE will automatically limit the maximum number of events stored. The limits are set on the volume of events stored locally in the PCE database, so that the events recorded in the database do not fill up the disk. The limit is a percentage of the disk capacity, cumulative for all services that store events on the disk.

IMPORTANT

To change the default limits, contact Illumio Support.

The configuration limit includes both hard and soft limits.

- Soft limit: 20% of disk used by event storage

  Aggressive pruning is triggered when the soft limit is reached. However, new events are still recorded while pruning. On the Events list page of the PCE Web Console, the `system_task.prune_old_log_events` event is displayed with the "Object creation soft limit exceeded" message and 'Severity: Informational'.
- Hard limit: 25% of disk used by event storage.

  More aggressive pruning is triggered when the hard limit is reached. New events are not recorded while pruning. On the Events list page of the PCE Web Console, the `system_task.prune_old_log_events` event is displayed with the message "Object creation hard limit exceeded" message and 'Severity: Error'. The pruning continues until the soft limit level of 20% is reached. When this occurs, a `system_task.hard_limit_recovery_completed` event occurs, and the PCE starts to behave as it did for the soft limit conditions.

SIEM Integration for Events

For analysis or other needs, event data can be sent using syslog to your own analytics or SIEM systems.

About SIEM Integration

This guide also explains how to configure the PCE to securely transfer PCE event data in the following message formats to some associated SIEM systems:

- JavaScript Object Notation (JSON), needed for SIEM applications, such as Splunk®.
- Common Event Format (CEF), needed for SIEM applications, such as Micro Focus ArcSight®.
- Log Event Extended Format (LEEF), needed for SIEM applications, such as IBM QRadar®.

Syslog Forwarding

The PCE can export logs to syslog. You can also use the PCE's own internal syslog configuration.

Identify Events in Syslog Stream

Event records from the syslog stream are identified by the following string:

```
"version":2
```

```
AND
```

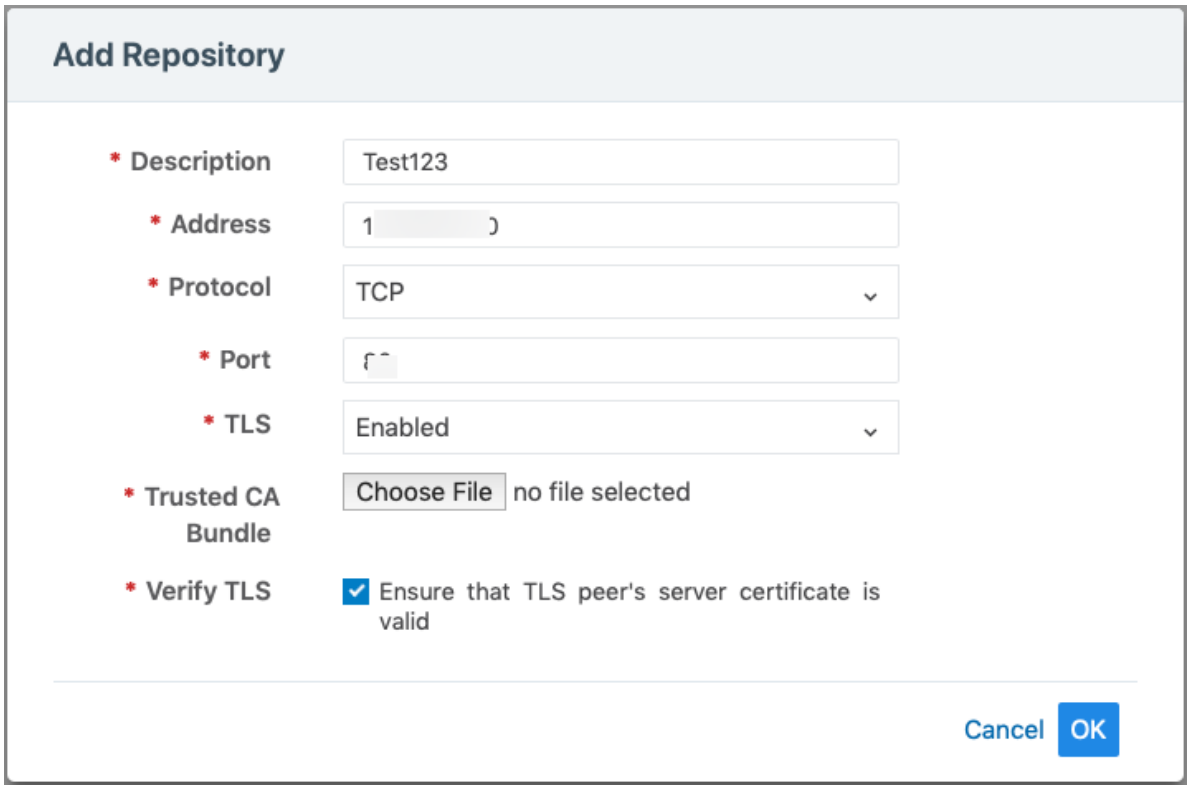
```
'"href":\s*"/orgs/[0-9]*/events'  OR  '"href":\s*"/system_events/'
```

Forward Events to External Syslog Server

The PCE has an internal syslog repository, "Local" where all the events get stored. You can control and configure the relaying of syslog messages from the PCE to multiple external syslog servers.

To configure forwarding to an external syslog server:

1. From the PCE web console menu, choose **Settings** > **Event Settings**.
2. Click **Add**.
   The Event Settings - Add Event Forwarding page opens.
3. Click **Add Repository**.



4. In the Add Repository dialog:
   - Description: Enter name of the syslog server.
   - Address: Enter the IP address for the syslog server.
   - Protocol: Select TCP or UDP. If you select UDP, you only need to enter the port number and click **OK** to save the configuration.
   - Port: Enter port number for the syslog server.
   - TLS: Select Disabled or Enabled. If you select Enabled, click “Choose File” and upload your organization's “Trusted CA Bundle” file from the location it is stored on.

     The Trusted CA Bundle contains all the certificates that the PCE (internal syslog service) needs to trust the external syslog server. If you are using a self-signed certificate, that certificate is uploaded. If you are using an internal CA, the certificate of the internal CA must be uploaded as the “Trusted CA Bundle”.
   - Verify TLS: Select the check-box to ensure that the TLS peer’s server certificate is valid.
5. Click **OK** to save the event forwarding configuration.

After ensuring that the events are being forwarded as configured to the correct external syslog servers, you can choose to stop using the “Local” server by editing the local server setting and deselect all message types.

NOTE
You cannot delete the “Local” server.

Disable Health Check Forwarding

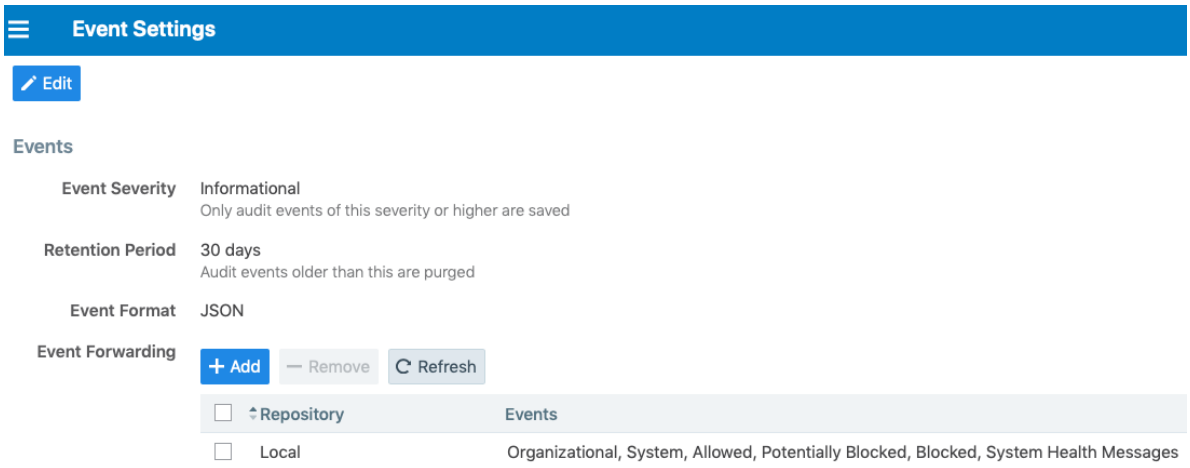
PCE system health messages are useful for PCE operations and monitoring. You can choose to forward them if they are needed on the remote destination.

For example, IBM QRadar is usually used by security personnel, who might not need to monitor the PCE system health. The Illumio App for QRadar does not process the PCE system health messages.

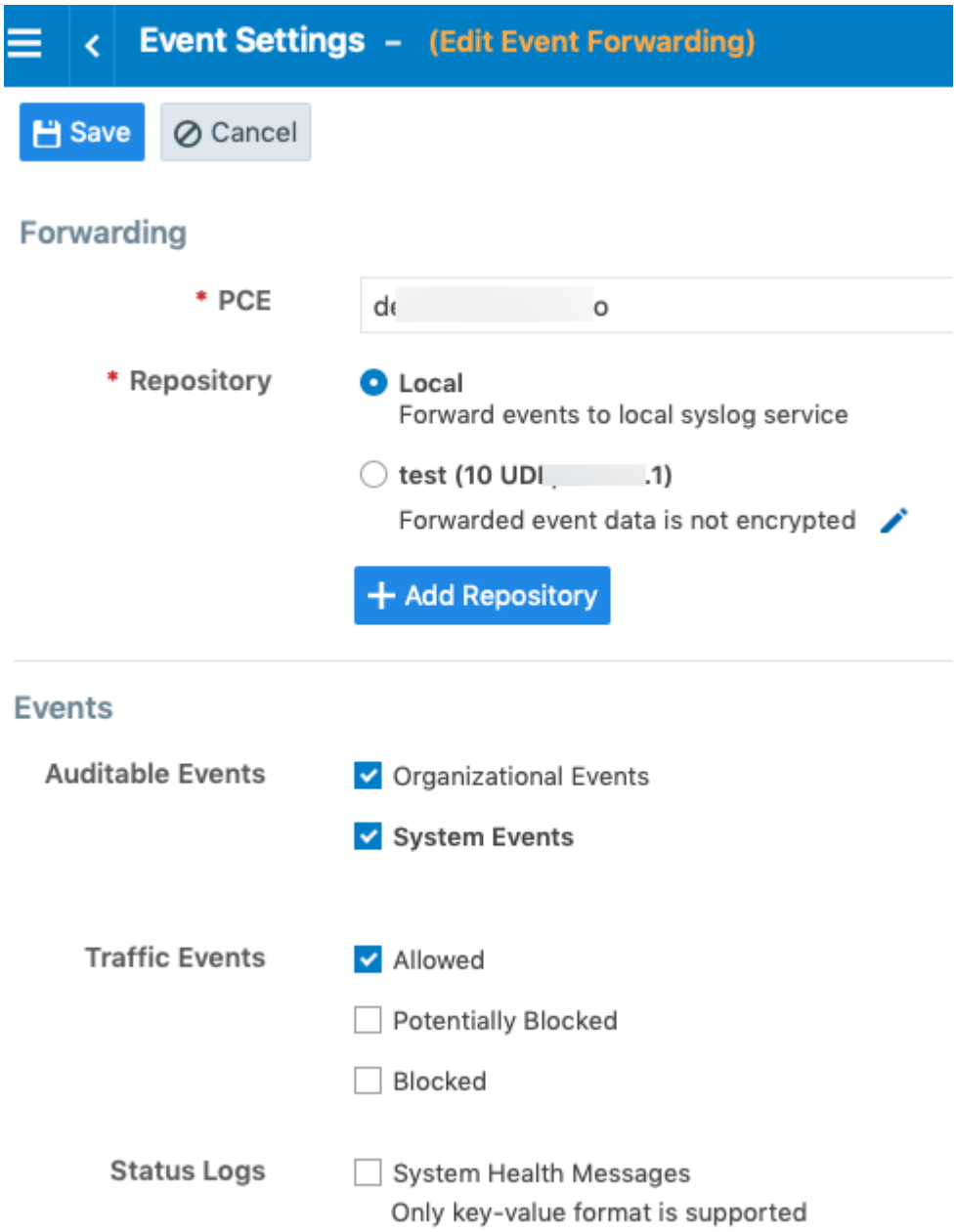
The PCE system health messages are only provided in key/value syslog format. They are not translatable into CEF, LEEF, or JSON formats. If your SIEM does not support processing key/value messages in syslog format, do not forward system health messages to those SIEMs. For example, IBM QRadar and Micro Focus ArcSight do not automatically parse these system health messages.

To disable syslog forwarding of health check messages:

1. From the PCE web console menu, choose **Settings** > **Event Settings**.
2. Click the Event listed under the **Events** column.



3. Under the Events block, for the Status Logs entry, deselect **System Health Messages**. System health check is only available in key-value format. Selecting a new event format does not change the system health check format to CEF or LEEF.



4. Click **Save**.

> **NOTE**
> IBM QRadar and HP ArcSight do not support system health messages. If you are using either of these for SIEM, make sure that you do not select the System Health Messages checkbox.

Traffic Flow Summaries

This section describes traffic flow summaries.

After you install a VEN on a workload and pair the VEN with the PCE, the VEN monitors each workload's traffic flows and sends the traffic flow summaries to the PCE.

Traffic summaries can be exported to syslog or Fluentd. If traffic data is configured for export, the PCE processes the received traffic flow summaries from each VEN and immediately sends them to syslog or Fluentd.

Traffic Flow Types and Properties

The Illumio Core logs traffic flows based on the Visibility setting. Events have attributes that can be Allowed, Blocked, or Potentially Blocked and might not appear in the traffic flow summary.

Visibility Settings

The table below indicates whether or not a traffic summary is logged as Allowed, Potentially Blocked, or Blocked depending on a workload's policy state.

NOTE

Traffic from workloads in the "Idle" policy state is not exported to syslog from the PCE.

Visibility	Logged in Traffic Flow Summary
Off	VEN does not log traffic connection information
Blocked - Low Detail	VEN logs connection information for blocked and potentially blocked traffic only
Blocked + Allowed - High Detail	VEN logs connection information for allowed, blocked, and potentially blocked traffic
Enhanced Data Collection	VEN logs byte counts in addition to connection details for allowed, blocked, and potentially blocked traffic

Event Types

In a traffic flow summary, the event type is designated by Policy Decision (`pd`).

NOTE

An asterisk (*) indicates the attribute might not appear in the summary.

Event Attributes	Allowed (pd=0)	Potentially Blocked (pd=1)	Blocked (pd=2)	Unknown (pd=3)
version	✓	✓	✓	✓
count	✓	✓	✓	✓
interval_sec	✓	✓	✓	✓
timestamp	✓	✓	✓	✓
dir	✓	✓	✓	✓
src_ip	✓	✓	✓	✓
dst_ip	✓	✓	✓	✓
proto	✓	✓	✓	✓
dst_prt	✓	✓	✓	✓
state	✓	✓	✓	✓
pd	✓	✓	✓	✓
code*	✓	✓	✓	✓
type*	✓	✓	✓	✓
dst_vulns*	✓	✓	✓	✓
fqdn*	✓	✓	✓	✓
un*	✓	✓	x	✓
pn*	✓	✓	x	✓
sn*	✓	✓	x	✓
src_labels*	✓	✓	✓	✓
dst_labels*	✓	✓	✓	✓
src_hostname*	✓	✓	✓	✓
dst_hostname*	✓	✓	✓	✓
src_href*	✓	✓	✓	✓
dst_href*	✓	✓	✓	✓

Show Amount of Data Transfer

The JSON, CEF, and LEEF for the accurate byte count work events are related to the 'Show Amount of Data Transfer' preview feature available with the Illumio Core 20.2.0 release.

The PCE now reports amount of data transferred in to and out of workloads and applications in a datacenter. The number of bytes sent by and received by the provider of an application

are provided separately. These values can be seen in traffic flow summaries streamed out of the PCE. This capability can be enabled on a per-workload basis in the Workload page. It can also be enabled in the pairing profile so that workloads are directly paired into this mode.

The direction reported in flow summary is from the viewpoint of the provider of the flow:

Destination Total Bytes Out: Number of bytes transferred out of provider:

```
dst_tbo
```

Destination Total Bytes In: Number of bytes transferred in to provider.

```
dst_tbi
```

To activate the 'Show Amount of Data Transfer' capability on the PCE, contact your Illumio representative.

LEEF Mapping

- LEEF field `X` contains JSON field `Y`
- `srcBytes` contains `dst_tbo`
- `dstBytes` contains `dst_tbi`
- `dbi` contains `dst_dbi`
- `dbo` contains `dst_dbo`

CEF Mapping

- CEF field cn2 is `dst_dbi` with cn2Label is “dbi”
- CEF field cn3 is `dst_dbo` with cn3Label is “dbo”
- CEF field “in” is `dst_tbi`
- CEF field “out” is `dst_tbo`

Manage Traffic Flows Using REST API

You can use the following properties to manage traffic flows using the REST API.

NOTE

You should ignore and *not* use any extra properties that are not described in this document, such as `tbi`, `tbo`, `dbi`, and `dbo`.

Property	Description	Type	Required	Possible Values
`version`	The version of the flow summary schema.	Integer	Yes	4
`timestamp`	Indicates the time (RFC3339) when the first flow in the summary was created, represented in UTC. Format: `yyyy-MM-dd'T'HH:mm:ss.SSSSSSZ`	String	Yes	
`interval_sec`	Sample duration for the flows in the summary. Default is approximately 600 seconds (10 minutes), depending on the VEN's ability to report traffic and PCE's current load.	Integer	Yes	
`dir`	Direction of the first packet: in or out (I, O).	String	Yes	I, O
`src_ip`	Source IP of the flows.	String	Yes	
`dst_ip`	Destination IP of the flows.	String	Yes	
`proto`	Protocol number (0-255).	Integer	Yes	Minimum=0 Maximum=255
`type`	The ICMP message type associated with the first flow in the summary. This value exists only if protocol is ICMP (1). **NOTE** This information is included in blocked flows for VEN versions lower than 19.1.0. It is included in all flows for VEN version 19.1.0 and later. Example: 3 for “Destination Unreachable.”	Integer	No	Minimum=0 Maximum=255
`code`	The ICMP message code (subtype) associated with the first flow in the summary. This value exists only if protocol is ICMP (1). **NOTE** This information is included in blocked flows for VEN versions lower than 19.1.0. It is included in all flows for VEN version 19.1.0 and later. Example: 1 for “Destination host unreachable.”	Integer	No	Minimum=0 Maximum=255
`dst_port`	Destination port.	Integer	Yes	Minimum=0

Property	Description	Type	Required	Possible Values
	This value exists only if protocol is not TCP (6) or UDP (17).			Maximum=65535
`pd`	Policy decision value, which indicates if the flow was allowed, potentially blocked (but allowed), blocked, or unknown. Possible values: • **0** – Allowed traffic • **1** – Allowed traffic but will be blocked after policy enforcement • **2** – Blocked traffic • **3** - Unknown **NOTE** Policy decision is "unknown" in the following cases: • Flows uploaded using existing bulk API (`/orgs/<org_id>/agents/bulk_traffic_flows`). • Flows uploaded using Network Flow Ingest Application (`/orgs/<org_id>/traffic_data`). • Traffic reported by idle VENs and specifically those that have been reported with "s" state (snapshot).	Integer	Yes	Minimum=0 Maximum=3
`count`	Count of the number of flows in the flow summary.	Integer	Yes	
`state`	Session state for the traffic flows in the flow summaries. Possible values: • **Active (A):** Connection was still open at the time the flow summary was logged. Applies to allowed and potentially blocked flows. • **Closed (C):** (Linux only) Connection closed at the time the flow summary was logged. Applies to allowed and potentially blocked flows. • **Timed out (T):** Connection timed out at the time the flow summary was logged. Applies to allowed and potentially blocked flows. Due to a limitation of WFP, a Windows VEN will report "T" even when the connection is closed at the time the flow summary was logged. • **Snapshot (S):** Snapshot of current connections to and from the VEN, which applies only to workloads whose policy state is set to Idle. Applies to allowed and potentially blocked flows. • **New connection (N):** Dropped TCP packet contains a SYN and is associated with a new connection. Applies to blocked TCP flows. The value is empty for blocked UDP flows.	String	No	A, C, T, S, N
`pn`	The program name is associated with the first flow of the summary. It is supported on inbound flows for Linux and	String	No	

Property	Description	Type	Required	Possible Values
	Windows VEN and on outbound flows for only Windows VEN. **NOTE** This information might not be available on short-lived processes, which are Linux-specific. Currently, flows are aggregated, so this value might represent only the first process detected across all aggregated flows. If network communication is done by an OS component (or a driver), no process is associated with it.			
`un`	The username is associated with the first flow of the summary. It is supported on inbound flows for Linux and Windows VEN and on outbound flows for only Linux VEN. On Windows, it can include the username of the user account that initiated the connection. **NOTE** This information might not be available on short-lived processes.	String	No	
`sn`	Service name associated with the first flow in the summary. It is supported only on inbound flows on Windows VEN.	String	No	
`src_hostname`	Hostname of the source workload that reported the flow.	String	No	
`src_href`	HREF of the source workload that reported the flow.	String	No	
`src_labels`	Labels applied to the source workload. **NOTE** The `src_hostname`, `src_href`, and `src_labels` values are not be included in a traffic summary if the source of the flow is not an Illumio-labeled workload. For example, Internet traffic or a managed workload without any labels applied.	Object	No	
`dst_hostname`	Hostname of the destination workload that reported the flow.	String	No	

Property	Description	Type	Required	Possible Values
`dst_href`	HREF of the destination workload that reported the flow.	String	No	
`dst_labels`	Labels applied to the destination workload. **NOTE** The `dst_hostname`, `dst_href`, and `dst_labels` values are not be included in a traffic summary if the destination of the flow is not an Illumio-labeled workload. For example, Internet traffic or a managed workload without any labels applied.	Object	No	
dst_vulns	Information about the vulnerabilities on the destination of the traffic flow with the specific port and protocol. **NOTE** • Vulnerabilities are defined by Common Vulnerabilities and Exposures (CVE), with identifiers and descriptive names from the U.S. Department of Homeland Security National Cybersecurity Center. • The vulnerability information is sent only when the Vulnerability Maps feature is turned on via a license and the information is imported into the PCE from a Vulnerability Scanner, such as Qualys.	Object	No	
`fqdn`	Fully qualified domain name	String	No	

The following table describes the sub-properties for the `dst_vulns` property:

Sub-property	Description	Type	Required
`count`	The total number of existing vulnerabilities on the destination port and protocol.	Integer	No
`max_score`	The maximum of all the scores for the vulnerabilities on the destination port and protocol.	Number	No
`cve_ids`	The list of CVE-IDs associated with the vulnerabilities that have the maximum score. Up to 100 displayed .	Array	No

Export Traffic Flow Summaries

Decide where to export the traffic flow summaries: syslog or Fluentd.

CAUTION

By default, from the 19.3.0 release on, the PCE generates all traffic flow summaries and sends them to syslog.

If you have not configured syslog, the syslog data by default is written to a local disk. For example, it is written to `/var/log/messages`.

Export to Syslog

To configure and export the traffic flow summaries to a remote syslog, follow these steps:

1. From the PCE web console menu, choose **Settings > Event Settings**.
2. Enable a remote syslog destination.
3. Select specific traffic flow summaries to be sent to remote syslog.
   This filters the selected traffic flow summaries and send those to the remote syslog.

To prevent the syslog data from being written to a local disk based on your preference, deselect the Events checkboxes on the **Settings** > **Event Settings** > Local page in the PCE web console. For more information, see Events Settings. [348]

NOTE

The generation of all traffic flow summaries is implemented to ensure that all of the traffic flow summaries are controlled from the PCE web console only.

This example shows the `runtime_env.yml` configuration to generate all types of flow summaries.

Export to Syslog

```
export_flow_summaries_to_syslog:
- accepted
- potentially_blocked
- blocked
```

This example shows the `runtime_env.yml` configuration if you do not want to generate any types of flow summaries.

Export to Syslog

```
export_flow_summaries_to_syslog:
- none
```

NOTE
Illumio does not currently support having a primary and secondary syslog configuration, with disaster recovery and failover.

You can configure it on a system syslog (local) and use the internal syslog configuration to send messages to local, which sends to system syslog.

Export to Fluentd

To generate and export the traffic flow summaries to Fluentd, follow these steps:

1. Set the `export_flow_summaries_to_fluentd` parameter in `runtime_env.yml`.
2. Set the `external_fluentd_aggregator_servers` parameter in `runtime_env.yml`.

This example shows the `runtime_env.yml` configuration to generate two types of flow summaries, out of the three possible types.

Export to Fluentd

```
external_fluentd_aggregator_servers:
- fluentd-server.domain.com:24224
export_flow_summaries_to_fluentd:
- accepted
- blocked
```

Flow Duration Attributes

The 20.2.0 VEN sends two new attributes to the syslog and fluentd output. The new attributes describe the flow duration and are appended to the flow data.

- **Delta flow duration in milliseconds** (`ddms`): The duration of the aggregate within the current sampling interval. This field enables you to calculate the bandwidth between two applications in a given sampling interval. The formula is dbo (delta bytes out) / delta_duration_ms, or dbi / delta_duration_ms.
- **Total flow duration in milliseconds** (`tdms`): The duration of the aggregate across all sampling intervals. This field enables you to calculate the average bandwidth of a connection between two applications. The formula is tbo (total bytes out) / total_duration_ms, or tbo / total_duration_ms. It also enables you to calculate the average volume of data in a connection between two applications. The formula is tbo (total bytes out) / count (number of flows in an aggregate), or tbi / count.

Traffic Flow Summary Examples

The following topic provides examples of traffic flow summaries in JSON, CEF, and LEEF, and messages that appear in syslog.

JSON

```
{
  "interval_sec": 600,
```

```
  "count": 1,
  "tbi": 73,
  "tbo": 0,
  "pn": "example-daemon",
  "un": "example",
  "src_ip": "xxx.xxx.xx.xxx",
  "dst_ip": "xxx.x.x.xxx",
  "timestamp": "2018-05-23T16:07:12-07:00",
  "dir": "I",
  "proto": 17,
  "dst_port": 5353,
  "state": "T",
  "src_labels": {
    "app": "AppLabel",
    "env": "Development",
    "loc": "Cloud",
    "role": "Web"
  },
  "src_hostname": "test-ubuntu-3",
  "src_href": "/orgs/1/workloads/xxxxxxxx-7741-4f71-899b-d6f495326b3f",
  "dst_labels": {
    "app": "AppLabel",
    "env": "Development",
    "loc": "AppLocation",
    "role": "Database"
  },
  "dst_hostname": "test-ubuntu-2",
  "dst_href": "/orgs/1/workloads/xxxxxxxx-012d-4651-b181-c6f2b269889e",
  "pd": 1,
  "dst_vulns": {
    "count": 8,
    "max_score": 8.5,
    "cve_ids": [
      "CVE-2016-2181",
      "CVE-2017-2241"
    ]
  },
  "fqdn" : "xxx.ubuntu.com",
  "version": 4
}
```


Syslog


```
2019-02-11T22:50:15.587390+00:00 level=info host=detest01 ip=100.1.0.1
program=illumio_pce/collector| sec=925415.586 sev=INFO pid=9944
 tid=30003240
rid=bb8ff798-1ef2-44b1-b74e-f13b89995520 {"interval_sec":1074,
"count":1,"tbi":3608,
"tbo":0,"pn":"company-daemon","un":"company","src_ip":"10.0.2.15",
"dst_ip":"211.0.0.232",
"class":"M","timestamp":"2019-02-11T14:48:09-08:00","dir":"I",
"proto":17,
"dst_port":5353,"state":"T","src_labels":{"app":"AppName",
"env":"Development","loc":"Cloud","role":"Web"},
"src_hostname":"dev-ubuntu-1",
"src_href":"/orgs/1/workloads/773f3e81-5779-4753-b879-35a1abe45838",
```

"dst_labels":{"app":"AppName","env":"Development","loc":"Cloud2",
"role":"Web"},
"dst_hostname":"dev-ubuntu-1","dst_href":"/orgs/1/workloads/
773f3e81-5779-4753-b879-35a1abe45838","pd":0,"dst_vulns":{"count":1,
"max_score":3.7,
"cve_ids":["CVE-2013-2566","CVE-2015-2808"]},"fqdn":"xxx.ubuntu.com",
"version":4}

Allowed Flow Summary (pd = 0)

2016-01-12T05:23:30+00:00 level=info host=myhost ip=127.0.0.1
program=illumio_pce/
collector| sec=576210.952 sev=INFO pid=25386 tid=16135120 rid=0
{"interval_sec":1244,"count":3,"dbi":180,"dbo":180,"pn":"sshd","un":"root",
"src_ip":"10.6.0.129","dst_ip":"10.6.0.129","timestamp":"2017-08-16T13:23:57
-07:00",
"dir":"I","proto":6,"dst_port":22,"state":"A","dst_labels":
{"app":"test_app_1","env":
"test_env_1","loc":"test_place_1","role":"test_access_1"},"dst_hostname":"co
rp-vm-2",
"dst_href":"/orgs/1/workloads/5ddcc33b-b6a4-4a15-b600-64f433e4ab33","pd":0,
"version":4}

Potentially Blocked Flow Summary (pd = 1)

2016-01-12T05:29:21+00:00 level=info host=myhost ip=127.0.0.1
program=illumio_pce/
collector| sec=576561.327 sev=INFO pid=25386 tid=16135120 rid=0
sec=920149.541
sev=INFO pid=1372 tid=30276700 rid=136019d0-f9d8-45f3-ac99-f43dd8015675
{"interval_sec":600,"count":1,"tbi":229,"tbo":0,"src_ip":"172.16.40.5",
"dst_ip":"172.16.40.255","timestamp":"2017-08-16T14:45:58-07:00","dir":"I",
"proto":17,"dst_port":138,"state":"T","dst_labels":{"app":"test_app_1",
"env":"test_env_1","loc":"test_place_1","role":"test_access_1"},"dst_hostnam
e":
"corp-vm-2","dst_href":"/orgs/1/workloads/5ddcc33b-b6a4-4a15-
b600-64f433e4ab33",
"pd":1,"version":4}

Blocked Flow Summary (pd = 2)

2016-01-12T05:23:30+00:00 level=info host=myhost ip=127.0.0.1
program=illumio_pce/
collector| sec=576210.831 sev=INFO pid=25386 tid=16135120 rid=0
sec=915000.311
sev=INFO pid=1372 tid=30302280 rid=90a01be5-a3c1-44f9-84fd-3c3a5eaec1f8
{"interval_sec":589,"count":1,"src_ip":"10.6.1.89","dst_ip":"10.6.255.255",
"timestamp":"2017-08-16T13:22:09-07:00","dir":"I","proto":17,"dst_port":138,
"dst_labels":{"app":"test_app_1","env":"test_env_1","loc":"test_place_1",
"role":"test_access_1"},"dst_hostname":"corp-vm-1","dst_href":"/orgs/1/
workloads/
a83ba658-576b-4946-800a-b39ba2a2e81a","pd":2,"version":4}

Unknown Flow Summary (pd = 3)

2019-06-14T05:33:45.442561+00:00 level=info host=devtest0 ip=127.0.0.1
program=illumio_pce/collector| sec=490425.442 sev=INFO pid=12381

```
tid=32524120
rid=6ef5a6ac-8a9c-4f46-9180-c0c91ef94759
{"dst_port":1022,"proto":6,"count":20,
"interval_sec":600,"timestamp":"2019-06-06T21:03:57Z","src_ip":"10.23.2.7",
"dst_ip":"10.0.2.15","dir":"O","state":"S","pd":3,"src_href":"/orgs/1/
workloads/
a0d735ce-c55f-4a38-965f-bf6e98173598","dst_hostname":"workload1",
"dst_href":"/orgs/1/workloads/a20eb1b5-10a4-419e-
b216-8b35c795a01e","src_labels":
{"app":"app","env":"Development","loc":"Amazon","role":"Load Balancer"}
,"version":4}
```

CEF

```
CEF:0|Illumio|PCE|2015.9.0|flow_potentially_blocked|Flow Potentially
Blocked|3|
act=potentially_blocked cat=flow_summary deviceDirection=0 dpt=137
src=someIPaddress
dst=someIPaddress proto=udp cnt=1 in=1638 out=0 rt=Jun 14 2018 01:50:14
cn1=120 cn1Label=interval_sec cs2=T cs2Label=state cs6=/orgs/1/workloads/
someID cs6Label=dst_href
cs4={"app":"CRM","env":"Development","loc":"AppLocation",
"role":"Web"} cs4Label=dst_labels dhost=connectivity-check.someDomainName
cs1={"count":1,"max_score":3.7,"cve_ids":
["CVE-2013-2566","CVE-2015-2808"]}
cs1Label=dst_vulns dvchost=someDomainName
```

Unknown Flow Summary (pd = 3)

```
2019-06-14T21:02:55.146101+00:00 level=info host=devtest0 ip=127.0.0.1
program=illumio_pce/collector| sec=546175.145 sev=INFO pid=15416
tid=40627440
 rid=f051856d-b9ee-4ac8-85ea-4cb857eefa82 CEF:0|Illumio|PCE|19.3.0|
flow_unknown|
Flow Unknown|1|act=unknown cat=flow_summary deviceDirection=0 dpt=22
src=10.0.2.2
 dst=10.0.2.15 proto=tcp cnt=6 in=6 out=6 rt=Jun 14 2019 21:02:25
duser=root
dproc=sshd cn1=31 cn1Label=interval_sec cs2=S cs2Label=state
dhost=workload1
cs6=/orgs/1/workloads/a20eb1b5-10a4-419e-b216-8b35c795a01e
cs6Label=dst_href
dvchost=devtest0.ilabs.io msg=
{"trafclass_code":"U"}
```

LEEF

```
LEEF:2.0|Illumio|PCE|2015.9.0|flow_blocked|cat=flow_summary
devTime=2018-06-14T10:38:53-07:00 devTimeFormat=yyyy-MM-dd'T'HH:mm:ssX
proto=udp sev=5 src=someIPaddress dst=someIPaddress dstPort=5353 count=15
dir=I intervalSec=56728 dstHostname=someHostName dstHref=/orgs/1/workloads/
someID
dstLabels={"app":"CRM","env":"Development","loc":"Cloud","role":"Web"}
dstVulns={"count":2,"max_score":3.7} dstFqdn=someDomainName "cve_ids":
["CVE-2013-2566","CVE-2015-2808"]}
```

Unknown Flow Summary (pd = 3)

```
2019-06-14T19:25:53.524103+00:00 level=info host=devtest0 ip=127.0.0.1
program=illumio_pce/collector| sec=540353.474 sev=INFO pid=9960 tid=36072680
 rid=49626dfa-d539-4cff-8999-1540df1a1f61 LEEF:2.0|Illumio|PCE|19.3.0|
flow_unknown|cat=flow_summary devTime=2019-06-06T21:03:57Z
devTimeFormat=yyyy-MM-dd'T'HH:mm:ssX proto=tcp sev=1 src=10.23.2.7
dst=10.0.2.15 dstPort=1022 count=20 dir=O intervalSec=600 state=S
srcHref=/orgs/1/workloads/a0d735ce-c55f-4a38-965f-bf6e98173598 srcLabels=
{"app":"app","env":"Staging","loc":"Azure","role":"API"}
dstHostname=workload1 dstHref=/orgs/1/workloads/a20eb1b5-10a4-419e-
b216-8b35c795a01e
```

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