TECHNICAL
DOCUMENTATION

Illumio REST APIs 26.1 (SaaS)

REST API Quick Reference

- 26.1 REST API Quick Reference
- 25.4 REST API Quick Reference
- 25.2.20 REST API Quick Reference and 25.2.10
- 24.5 REST API Quick Reference
- 24.2.40, 24.2.20, 24.2.10 Quick Reference
- 23.5 REST API Quick Reference
- 23.2 REST API Quick Reference
- 22.5 REST API Quick Reference

Open API Spec in JSON

- 26.1 Open API Spec in JSON
- 25.4 Open API Spec in JSON
- 25.2.20 Open API Spec in JSON
- 25.2.10 Open API Spec in JSON
- 24.5 Open API Spec in JSON
- 24.2.20 Open API Spec in JSON and 24.2.10 Open API Spec in JSON
- 23.5 Open API Spec in JSON
- 23.2 Open API Spec in JSON
- 22.5 Open API Spec in JSON

API Public Schemas (Zipped Files)

- 26.1 API Public Schemas
- 25.4 API Public Schemas
- 25.2.20 API Public Schemas
- 25.2.10 API Public Schemas
- 24.5 API Public Schemas
- 24.2.20 API Public Schemas and 24.2.10 API Public Schemas
- 23.5 API Public Schemas
- 23.2 API Public Schemas
- 22.5 API Public Schemas

Table of Contents

REST APIs 26.1 (SaaS)

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.

New and Changed APIs in 25.4

Here's a summary of the new and enhanced APIs in this release.

Runtime Parameter to Support More than 8 Labels for Rule Search

A new parameter has been added to the runtime environment:

`max_rule_search_provider_consumer_entities`

By default, the maximum number of rule search provider consumer entities is eight. However, this restriction is not rigid and can be tailored to specific needs.

This parameter constrains the overall count of labels (sum) spanning all dimensions.

```
{
  "properties": {
    "max_rule_search_provider_consumer_entities": {
      "description": "Maximum number of rule search provider
consumer entities",
      "type": "integer",
      "default": 8
    }
  }
}
```

kubernetes_workload

A new property named `kubernetes_workload` was added to the API `sec_policy_rule_coverage_post`

It allows observing coverage of security policy rules for individual Kubernetes Workloads. This change allows the PCE to make a correct policy decision for traffic in draft view.

```
},
          "kubernetes_workload": {
            "description": "Source kubernetes workload",
            "type": "object",
            "additionalProperties": false,
            "properties": {
              "href": {
                "description": "URI of kubernetes workload",
                "type": "string"
              }
            }
          },
```

golden_image

The property `golden_image` has been added to two APIs:

```
GET /api/v2/orgs/:xorg_id/vens/:uuid
```

```
PUT /api/v2/orgs/:xorg_id/vens/:uuid
```

```
{
  "properties": {
    "golden_image": {
      "description": "Indicates whether this VEN is a golden
image",
      "type": "boolean",
      "default": false
    }
  }
}
```

The `golden_image` flag is added to prevent accidental deletion of images that are kept offline and used for cloning.

Administrators now have the option to create a toggleable flag in the PCE interface to mark VEN as golden images. See Setting up the Golden Image Flag.

API Classification and Version

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

Public Stable APIs

Public Stable APIs are available to all Illumio customers, are documented, and are stable without further breaking changes. In case of a breaking change, a new version will be introduced, with the previous version supported for at least six months.

Public Experimental APIs

Public Experimental APIs are available to all customers and documented, but may change between releases. Some APIs may transition to Public Stable or become unavailable in the future.

Private APIs

Private APIs are specifically used within the PCE web console. They are not accessible to end-users, are undocumented, and are not supported for external usage.

Illumio REST API Versions

API versions align with other Illumio component releases.

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 an underscore rather than slashes. For example, the payload schema file for the login API is named `user_login_get.schema.json`.

REST API URIs

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

API Version and Organization HREF

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

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

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 it 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, 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 Illumio Segmentation for Data Centers REST API.

GET Collections URI Syntax

The base URI for the 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 can also 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/:pversion/
[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, 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.

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's 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. It 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, which are designed specifically for operations that produce errors. The `Request-ID` helps Illumio support troubleshoot 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 that 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 the JSON body is returned.
`201 Created`	Successful `POST` operation where an object was created.
`204 No Content`	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. Error code 400 usually means that the resource is

unavailable (such as trying to update a previously deleted label) or that the URL contains a mistake (such as specifying /labels 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, the username or password was 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**/, a missing or incorrect **org_id**, `/orgs/{org_id}/`, a wrong URL, or a misspelled endpoint.
404 Page not found	For example, the wrong org_id in the URI or a 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 occur if more than one query parameter is used and the URI (including the query parameters) is not enclosed in single 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 blank space is missing between `-u uname:'pswd'` and the next option, `-H 'Accept: application/json'`.

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

- It can be caused by an incorrect curl command, such as 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

- A missing or incomplete request body can cause it.

[{"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'`?

REST API Limits

When making API calls, consider 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 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/"025cc8bfcXXXXXXXXX7900081e7c6cb"
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

When naming resources, the PCE has a 255-character limit for each name string. 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.

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

A few standard curl options are defined for the Curl examples provided in this API documentation.

The user and password to use for server authentication:

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

Code examples typically use constants for -u username:'password' arguments for brevity. $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 to see the total number of workloads when using `GET workloads`, you might get various error messages like `curl: (3) Illegal port number`. Remove the `-i` option and retry the Curl command to work around this issue.

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

Authentication

Before using the Illumio REST API to access the PCE, you must use the Login Users API to authenticate with the Illumio Login Service and obtain an authentication token.

Authenticate to the Login Service

Before using the Illumio REST API to access the PCE, use the Login Users API to authenticate with the Illumio Login Service and obtain an authentication token. This authentication token expires in 30 seconds.

For SaaS customers, the PCE URL can be different based on their SaaS PCE:

- SCP1 & SCP2 (US)
- SCP3 UK only
- SCP4 APAC
- SCP5 (EMEA)

If you have deployed the PCE as software, then the hostname for the PCE is the value you defined for the '`pce_fqdn`' parameter in the `runtime_env.yml` file.

Once obtained, you can pass the authentication token to the PCE you want to access using the Login API. Once you have authenticated with the PCE and received a session token, you can make additional API calls or create an API Key for persistent access to the PCE's API.

URI to Authenticate with the Login Service

```
POST [api_version]/login_users/authenticate
```

Create an Authentication Token for the Login Service

To create an authentication token and authenticate with the Login Service, specify the Fully Qualified Domain Name (FQDN) of the PCE you want to access in the call.

Parameter	Description	Type	Required
`pce_fqdn`	Fully Qualified Domain Name (FQDN) of the PCE If you have deployed the PCE virtual appliance in your network, use the FQDN specified during installation.	String	Yes

Curl Commands for Authentication

When you received your invitation, you created your PCE account using an email and a password. Use these credentials to make a call and authenticate now.

If you haven't received an invitation, contact your Illumio administrator.

Example (local users only, use SAML ID for remote users):

- `joe_user@example.com` (username)
- `password` (password)

You also need the FQDN of the Login Server plus the FQDN of the PCE host you want to access:

- The Login Server FQDN for Cloud users is `https://login.illum.io:443`
- The PCE FQDN is `scp1.illum.io`

NOTE

The authorization token returned (`auth_token`) expires after 30 seconds of inactivity. Be ready to call `GET users/login` to create session credentials immediately after making a call to `login_users/authenticate`.

Optional Features

This API was introduced to help prevent misconfigured DNS, which can disrupt VEN connectivity. Likewise, misconfiguring DHCP can cause IP address conflicts.

Invoke the Optional Features API

You need a key to invoke the /optional_features API to enable `editable_dns_client_rule` or `editable_dhcp_client_rule`. Such a key involves a portion that is tightly controlled so that it cannot be randomly generated.

Once the key is generated, it cannot be used in more than one place. For example, an API call made to customer #1 cannot be replayed for customer #2, who must request their own key.

An example of the generated key:

```
secret =
        '...'   # value embedded in code

data = Base64.strict_encode64({
    'pce_fqdn'   => Illumio::RuntimeEnvironment.pce_fqdn,
    'org_id'   => xorg_id,
    'optional_feature'   =>
    'editable_dns_client_rule' ,
    'not_valid_after'   => Time.now.utc.iso8601
})

key = data + OpenSSL::HMAC.hexdigest( 'SHA256' , secret, data)
```

Setting Optional Features

Analytics opt-out

The property `configurable_label_dimension` was added so that the UI users can determine if an organization has enabled user analytics.

Analytics is opt-in by default. If it has been disabled, the UI does not track analytics for that organization.

To set or clear the optional analytics feature, use:

```
{
name: "ui_analytics", enabled: false|true
}
```

Illumination Classic opt-out

The property illumination_classic is added to enable or disable the feature.

To set or clear the optional Illumination Classic feature, use:

```
{
name: "illumination_classic", enabled: false|true
}
```

Label-Based Network Detection

The APIs

- `POST /api/v2/orgs/{org_id}/networks`
- `PUT /api/v2/orgs/{org_id}/networks/:network_id`

require that one of the following optional features is enabled :

- `label_based_network_detection`
- `cidr_network_detection_enabled`

In addition, both APIs are implementing input validation on payload content:

- If the CIDRs field is provided, the optional feature `cidr_network_detection_enabled` must be set.
- If the scopes field is provided, the optional feature `label_based_network_detection` must be enabled.

The example response for the API `optional_features_put` with the `label_based_network_detection` enabled:

```
"illumination_classic",
        "ransomware_readiness_dashboard",
        "per_rule_flow_log_setting",
        "lightning_default",
        "label_based_network_detection"
        ]
    },
    "enabled": {
```

labels_editing_warning_for_enforcement_mode

In releases 23.2.10 and 23.4, for the required property `name` a new optional feature flag for label editing was added: `labels_editing_warning_for_enforcement_mode`.

To enable or disable this flag, use the following CURL command:

```
curl -u ${your_api_key}: ${your_api_secret} -H "Content-Type:
application/json" -X PUT -d
'[{"name":"labels_editing_warning_for_enforcement_mode","enable
d":true}]' https://${your_pce_server}:8443/api/v2/orgs/$
{your_ord_id}/optional_features
```

windows_outbound_process_enforcement

In release 23.5, an optional feature flag for the Windows outbound process was added: `windows_outbound_process_enforcement`.

This feature flag can be enabled or disabled using the following CURL command:

```
curl -u ${your_api_key}: ${your_api_secret} -H "Content-Type:
application/json" -X PUT -d
'[{"name":"windows_outbound_process_enforcement","enabled":true
}]' https://${your_pce_server}:8443/api/v2/orgs/${your_ord_id}/
optional_features
```

where you can define the part of the command: `"enabled":true` or `"enabled":false`.

container_cluster_label_set_based_kubernetes_workload_instructions

This flag is enabled by default at the organization level.

When enabled, PCE uses policy de-duplication for Kubernetes workloads in CLAS Container Clusters. This means we calculate only one workload instruction per Kubernetes Workload with the same set of labels.

This reduces the number of calculated instructions in production by 70-95%, depending on the customer.

hybrid_policy

The property `hybrid_policy` activates the feature flag of the same name.

```
"properties": {
          "name": {
            "description": "Name of the feature",
            "type": "string",
            "enum": [
              "ip_forwarding_firewall_setting",
              "ui_analytics",
              "illumination_classic",
              "ransomware_readiness_dashboard",
              "per_rule_flow_log_setting",
              "lightning_default",
              "collector_scanner_filters",
              "corporate_ips_groups",
              "labels_editing_warning_for_enforcement_mode",
              "label_based_network_detection",
              "cloudsecure_enabled",
              "windows_outbound_process_enforcement",
              "rule_based_label_mapping",
              "core_insights",
              "rule_info_exposure_to_syslog",
              "hybrid_policy",

"container_cluster_label_set_based_kubernetes_workload_instruct
ions"
```

To see more details about using the feature flag `hybrid_policy`, see Hybrid Policy in the document What's New in release 25.2.10.

After hybrid policies are enabled, your on-premises and applicable cloud networks can use non-overlapping private IP subnets. Any policies between on-premises and cloud workloads are distributed to the appropriate on-premises workloads and cloud resources.

Hybrid policy support is available only to applicable customers.

container_cluster_label_set_based_kubernetes_workload_instructions

This parameter is enabled with HelmChart flag `policyLabelSetEnable` set to **true**.

For label-based rules, workload instructions calculate unique label sets only once.

This new parameter reduces overall policy calculation time by eliminating redundant calculations.

API Keys

API keys provide a persistent means of authentication with the PCE and are recommended for scripting purposes.

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, allowing them to 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 deleted.

IMPORTANT

Any tooling that parses HTTP headers should be modified to support case-insensitive header name matching, thereby retaining 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_xxxxxxxxxxx29" (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_ac-
count&state=expired
```

```
GET /api/v2/orgs/:xorg_id/api_keys?type=service_ac-
count&state=active
```

Create API Keys in the Web Console

You can create API keys using the Web console with the **User** Menu:

1. In the drop-down **User** menu, select **My API Keys**.
   A list of configured API keys is displayed.
   The message "No API Keys" is displayed if no API keys are configured.
2. To add a new API key, click **Add**.
3. In the **Create API Key** pop-up window, enter the name of the API key in the Name field. Optionally, enter a description in the Description field.
4. Click **Save** to save your API key or **Cancel** to close the pop-up window without saving your changes.
5. When the **API Key Created** window appears, click the **>** button next to "Show credentials" to display the credentials for your API key.
   The following information is displayed:
   - **Key ID:** The unique ID of the API key
   - **Authentication Username:** The username that authenticates the API calls
   - **Secret:** The password for the API key
6. Click **Download Credentials** to download the credentials as a text file. Ensure that you have saved the credential information before clicking Done.

After you click **Done**, the API Keys page displays a summary of your new API key, including the following information:

- Name
- Description
- Key ID
- Authentication Username
- Created On

NOTE

The credential information is displayed only once. Ensure that you save it in a secure location, as it is used to access your organization's API. If you lose your credential information, you must create a new API key.

Service Account-based API Keys

Service account-based APIs enable the creation and management of API keys associated with a service account.

You can manage the expiration of service account-based API keys.

NOTE

When Service Accounts were introduced, the following restriction was explicitly added: a Service Account cannot be used to operate on service accounts and user-related resources.

This restriction was removed in release 23.4.0: a Service Account api_key can perform most operations, similar to a user api_key, except for APIs that require user context. The APIs were not changed to support this restriction removal.

Service accounts are always organization-based and specific to a PCE.

Users create their permissions while creating a service account, and an API key is implicitly created. Deleting a service account removes its permissions and all associated API keys.

Service-based API Key Methods

Table 1. Service-based API Key Methods

Functionality	HTTP	URI
List all service account API keys.	GET	[api_version][org_href]/api_keys?type=service_account
To retrieve a specific service account	GET	[api_version][org_href]/service_accounts/:service_account_id
To retrieve all API keys, regardless of the account	GET	api_keys
Create a new service account API key.	POST	[api_version][org_href]/service_accounts
To create a new service account API key after performing the required validation	POST	[api_version][org_href]/service_accounts/:service_account_id/api_keys
Update a service account.	PUT	[api_version][org_href]/service_accounts/:service_account_id
Delete a service account API key.	DELETE	[api_version][org_href]/service_accounts/:service_account_id/api_keys/:key_id
Delete a service account that includes any associated API keys.	DELETE	[api_version][org_href]/service_accounts/:service_account_id

The expiration time of service account-based API keys is defined by owners who can specify the default expiration time.

The key expiration time is specified with a default value in the settings, where the expiration date of an existing API key cannot be modified.

When an expired API key authenticates an API request, the request is rejected. The audit event triggered by this failure includes the API key's Key ID and its expired status. The details also include the expiration date and the `last_used_at` date.

Settings

Settings for service account-based API keys specify the default expiration period for service account keys and the retention period for expired keys.

The Public Experimental APIs that manage API key settings are based on the role of the organization administrator **(this_org_admin)**) and are as follows:

- Support for viewing **api_key** settings for an organization.
  `GET /api/v2/orgs/:xorg_id/settings`
  This API now includes the new property num_assets_requiring_ransomware_protection, which defines several assets for this organization that need ransomware protection.
- Support for updating api_key settings for an organization.
  `PUT /api/v2/orgs/:xorg_id/setting`
  API key expiration is now set between -1 and 2147483647 seconds, and expired key retention is a minimum of 0 seconds.

The `settings_put.schema.json` was changed to include the new property `num_assets_requiring_ransomware_protection`. The number of assets that require ransomware protection in a specific organization ranges from one to 9999999.

The new property `ven_maintenance_token` identifies if the tampering protection for the VEN and endpoints is enabled. The default is **not enabled**.

User-based API Keys

This Public Stable API allows you to manage API keys and make API calls to the PCE.

Working with User-based API Keys

Table 2. User API Key Methods

Functionality	HTTP	URI
Get a collection of API keys.	`GET`	[api_version][user_href]/api_keys
Get an individual API ke.y	`GET`	[api_version][api_key_href]
Create an API key	`POST`	[api_version][user_href]/api_keys
Update an API key	`PUT`	[api_version][api_key_href]
Delete an API key	`DELETE`	[api_version][api_key_href]

List User-based API Keys

When you GET an individual API key or a collection of API keys, the response only returns those created by the user who authenticated with the PCE for the session.

This API gets one API key or a collection of API keys created by a specific user. To get a single API key, you need to know the API key's URI, which is

returned as an HREF path when you create an API key, and the HREF of the user who created the key.

You can query the user API keys as follows:

```
GET /api/v2/orgs/:xorg_id/api_keys?type=user
```

You can also query the user-based API keys based on their expiration:

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

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

```
GET [api_version][user_href]/api_keys
```

Create User-based API Keys

This API creates a unique API key and returns an API key ID and secret. You can use these to obtain, update, or delete the key and make other API calls.

To create an API key, you must authenticate using a session token or another API key. To obtain a session token, use the Users API and authenticate with the PCE. You will receive your user ID, user HREF, and a session token that you can use when you call this API to create an API key.

IMPORTANT

If you use an API key, safely store both the key and the secret. Anyone with access to both will have access to your organization's API.

IMPORTANT

Due to security concerns, external users cannot create an API Key, even if their roles permit it.

Update User-based API Keys

This API enables you to update the name or description of an API key.

To make this call, you need the API key URI, which is returned as an HREF path when you create a User-Based API Key.

```
PUT [api_version][api_key_href
```

Delete User-based API Keys

To delete an API key, you need the unique API key ID, which is returned as an HREF path property when you create a new API key or get a single or a collection of API keys.

```
DELETE [api_version][api_key_href]
```

API Keys Reference

This topic covers parameters, properties, and examples for API keys.

Parameters

Parameter	Description	Type
`user_id`	The user ID in the form of an HREF (e.g., '`users/6`') of the user who created the API key.	String
`api_key_id`	This is the actual API key ID. It is used only for DELETE.	String
`org_id`	Organization ID	Integer
`max_results`	The maximum number of api keys to return.	Integer
`username`	The username of the user to filter by	String
`name`	(POST, PUT, GET) The key name - just a label to be used	String
`role`	Role URI (JSON-encoded string) to filter on	String
`state`	State of api keys - active or expired	String
`type`	Type of principal - User or Service Account	String

Some parameters have been renamed or deprecated to allow differentiation between the type `user`and `service_account`:

- Query parameter `name`is retained for the type `service_account`
- Query parameter `name`is changed to `username` for the type `user`
- Query parameter `service_account_name` was deprecated and consolidated to `name`
- Query parameter `api_key_name` was deprecated and removed as not needed

Properties

Property	Description	Type
`key_id`	This is the actual API key ID. Use this query parameter only for a GET instance call.	String
`auth_username`	Username required for authentication	String
`created_at`	Timestamp when this key was first created (RFC 3339)	String
`name`	The key name is just a label to be used.	String
`href`	URI of the key	date/time

Examples

Curl Command to Get a Key

The API key is identified in the form of an HREF path property:

```
"/users/11/api_keys/a034248fbcdd60b4"
```

```
curl -i -X GET https://pce.my-company.com:8443/api/v2/users/11/
api_keys/a034248fbcdd60b4 -H "Accept: application/json" -u
$KEY:$TOKEN
```

Get a Collection of Keys

To use an API key, store the key and secret safely. Anyone with access to both has access to your organization's API.

Due to security concerns, external users are not allowed to create an API Key even if their roles allow it.

```
curl -i -X GET https://pce.my-company.com:8443/api/v2/users/11/
api_keys -H "Accept: application/json" -u $KEY:$TOKEN
```

Response Body

An API key is represented by its HREF path, as shown here:

```
/users/29/api_keys/1e9bb1787883639d5
```

For example:

```
[
  {
    "href": "/users/29/api_keys/1e9bb1787883639d5",
    "key_id": "1e9bb1787883639d5",
    "auth_username": "api_1e9bb1787883639d5",
    "created_at": "2020-01-27T01:30:22.274Z",
    "name": "my_api_key",
    "description": "my_scripting_key"
  },
  {
    "href": "/users/29/api_keys/1793df73a99255f7e",
    "key_id": "1793df73a99255f7e",
    "auth_username": "api_1793df73a99255f7e",
    "created_at": "2016-03-14T16:20:43.603Z",
    "name": "MyKey",
    "description": "My Special Key"
  }
]
```

Get All Labels with a Key

If you use an API key to get a collection of labels in an organization, and your API key uses these credentials:

- `api_xxxxxxx64fcee809` is the API key
- `xxxxxxx09137412532289d6ecd10bc89c6b1f608c9a85482e7a573` is the secret (API key password)

```
curl -i -X GET https://pce.my-company.com:8443/api/v2/orgs/3/
labels -H "Accept: application/json" -u
api_xxxxxxx64fcee809:'xxxxxxx09137412532289d6ecd10bc89c6b1f608c
9a85482e7a573'
```

This document represents session and persistent (API key) credentials as the constants $KEY:$TOKEN (without spaces).

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

Examples to Create API Keys

URI

```
POST [api_version][user_href]/api_keys
```

An example user HREF looks like this:

```
/users/99
```

```
{
     "name": "my_api_key",
     "description": "my_scripting_key"
}
```

To create a user-based API key

In this curl command, the user authentication (`-u`) uses the session credentials returned from calling the Login API to log in a user. The API key is passed as a JSON object formatted inside double quotes in the command:

```
curl -i -X POST https://pce.my-company.com:8443/api/v2/
users/14/api_keys -H "Content-Type:application/json"
-u user_14:'xxxxxxx563199f92af7b705ddca2685'-d "{
"name":"my_api_key","description":"my_scripting_key" }"
```

Response Body

This example shows the response from creating an API key, which you can use for making other API calls. These values do not expire. The `auth_username` functions as the username, and the secret functions as the password when making other API calls:

```
{
     key_id: "xxxxxxx6654188229"
     secret: "xxxxxxxxxxxa6a85ce846a706e134ef1d4bf
              2ac1f253b84c1bf8df6b83c70d95"
     auth_username: api_xxxxxxx6654188229
}
```

These values can now be used to authenticate with the API as follows:

- Username: `api_xxxxxxx29api_xxxxxxx6654188229`

- Password: `xxxxxxxxxxa6a85ce846a706e134ef1d4bf2ac1f253b84c1bf8df6b83c70d95`

Parameters for Service-based API Keys

Parameter	Description	Type	Required
`org_id`	Organization ID.(GET, POST, PUT, DELETE)	Integer	Yes
`max_results`	Maximum number of service accounts to return (GET)	Integer	No
`name`	Name of service account to filter by	String	No(GET) Yes(POST)
`role`	Role URI (JSON-encoded string) to filter on(GET)	String	No
`service_account_id`	Service account UUID (GET account info, DELETE, PUT, POST)	String	Yes
`api_key_id`	API Key ID (DELETE)	String	Yes

Properties for Service-based API Keys

Property	Description	Type	Required
`name`	Service account name	String	Yes
`href`			Yes
`created at`	Timestamp when this service account was first created (RFC 3339)	date/time	Yes
`updated_at`	Timestamp when this service account was last updated	date/time	Yes
`created_by`	The user who created this service account Required: href	Object	Yes
`updated_by`	The user who last updated this service account	String	Yes
`permissions`	List of permissions: required: `role`, `scope`	Array	Yes
`role`	Reference to `common/orgs_roles.schema.json`		
`scope`	Reference to `org_scope.schema.json`		
`api_keys`	List of associated api_keys Reference to `api_keys_get.schema.json`		Yes
`api_key`	required: "expires_in_seconds" "type": "integer", "minimum": -1, "maximum": 2147483647	Object	
`access_restriction`	Access restriction assigned to the keys created under this service_account	Object, Null	No
`href`	URI of service_account	String	
`api_keys`	List of associated api_keys Reference to `api_keys_get.schema.json`	Array	No

Property	Description	Type	Required
expires_in_seconds	Validity of the api_key, in seconds "type": "integer", "minimum": -1, "maximum": 2147483647	String	No
last_login_on	Timestamp when this key was last used	date/time	
account	required: "href": Associated identity "type": Type of the account "name": Name of the account		Yes Yes Yes
service_account_id	API Key ID (DELETE)	String	No
api_key_id	API Key ID (DELETE)	String	Yes

Parameters for api_keys_get (all API keys)

Parameter	Description	Type	Required
key_id	Key ID	String	Yes
auth_username	Username required for authentication	String	Yes
name	The key name is just a label to be used	String	Yes
role	Role URI (JSON-encoded string) to filter on(GET)	String	No
service_account_id	Service account UUID (GET account info, DELETE, PUT, POST)	String	No
api_key_id	API Key ID (DELETE)	String	No

Response Properties for api_keys_get (all API keys)

Property	Description	Type	Required
`key_id`	Key ID	String	Yes
`auth_username`	Username required for authentication	String	Yes
`created at`	Timestamp when this service account was first created (RFC 3339)	date/time	Yes
`name`	Service account name	String	Yes
			Yes
`href`	URI of the key	String	Yes
`state`	State of the api_key	String	No
`expires_in_seconds`	Validity of the api_key, in seconds	String	No
`created_by`	The user who created this api key	String	No
`last_login_on`	Timestamp when this key was last used	date/time	
	Examle: "last_login_on": "2023-04-22T03:54:25Z"		
`account`	required:		Yes
	"href": Associated identity		Yes
	"type": Type of the account		Yes
	"name": Name of the account		
`access_restriction`	Access restriction assigned to the keys created under this service_account	Object, Null	
`permissions`	List of permissions:	Array	Yes
	required: `role`, `scope`		
`role`	Reference to `common/orgs_roles.schema.json`		
`scope`	Reference to `org_scope.schema.json`		

Create a new Service Account API Key

Request

```
{
    "name": "key3",
    "description": "testing key 3",
    "access_restriction": {
        "href": "/orgs/1/access_restrictions/2"
        },
    "permissions": [
        {
        "role": { "href": "/orgs/1/roles/ruleset_manager"},
        "scope": [
        {
            "label": {
            "href": "/orgs/1/labels/9",
            "key": "env",
            "value": "Development"
        }
    }
    ]
},
{
        "role": { "href": "/orgs/1/roles/owner" },
        "scope":  []
    }
],
    "api_key": {
    "expires_in_seconds": 86400
    }
}
```

Response

```
{
    "name": "service_account1",
    "description": "testing service_account",
    "href": "/orgs/1/service_accounts/33ed7e04-9b25-
                4c9a-a031-a6b1bd437807",
    "access_restriction": {
        "href": "/orgs/1/access_restrictions/2"
        },
    "permissions": [
        {
        "href": "/orgs/1/permissions/84e5541f-3349-
                        41c9-8fdb-9756faf96baa",
        "role": {"href": "/orgs/1/roles/ruleset_manager"
            },
        "scope": [
            {
            "label": {
            "href": "/orgs/1/labels/9"
        }
    }
    ]
},
{
        "role": {
            "href": "/orgs/1/roles/owner"
        },
        "scope": []
        }
    ],
    "api_key": {
        "auth_username": "api_135c247aa6e3b654e",
    "secret": "ab80cc497f7556e0cd72703c5229d814322c
                  301d14d2d8d8c7060d516990097b"
    }
}
```


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 and 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 a 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. Then, use those credentials to make other API calls in the script. 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 the 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'
```

No Log Rules

The No Log Rules feature reduces data volume (and cost) by ignoring traffic not worth inspecting from a security perspective, like 443/80 from the internet to public-facing web servers.

The No Log Rules feature enables you to mark rules as "no log," meaning any flows matching those rules will not be logged in the vTap logs on the VEN and will not be reported to the PCE.

To use this feature, you need to enable the flag:

```
[{ "name": "per_rule_flow_log_setting", "enabled": true }]
```

Implementing the No Log Rules Feature

To implement the No Log Rules feature, follow these steps:

1. Enable the flag `per_rule_flow_log_setting` by setting it to **true**.
2. Write segmentation rules for the flows you want to allow without logging.
3. Use the API to flip the property **log_flow** on these rules.

When using the No Log Feature:

- In cases where "regular" and "no log" rules overlap, the "no log" rule will always be evaluated first, and the flows will not be logged.
- These rules will only be sent to VENs 22.5.0 or newer.
- If the feature flag is disabled, the "log_flow" property will not be returned in the API responses, and it will not be possible to set the property using the API.
- There is currently no UI support for this feature, so there will be no visual indication that the rules are set to "log_flow: false."

Enabling the Feature Flag

To enable the No Log feature flag, execute the cURL command:

```
curl -X PUT -u $API_USER:$API_PASS -H 'Content-type: applica-
tion/json' --data-raw '[{"name": "per_rule_flow_log_setting",
"enabled": true}]' $PCE_URL/api/v2/orgs/1/optional_features
```

Verify that the flag was enabled:

```
curl -u $API_USER:$API_PASS $PCE_URL/api/v2/orgs/1/option-
al_features | jq '.' | grep "per_rule_flow_log_setting" -C
```

If the commands were successful, you will see the following:

```
{
    "name": "per_rule_flow_log_setting",
    "enabled": true
},
```

Writing Segmentation Rules

When writing rules to implement the No Log Rules feature, do not provision them immediately.

You might create a separate ruleset for these rules and clarify that these are No Log Rules in the name because there is currently no UI indication of whether or not the flag is enabled on the rules.

Once you've created the rules, you must get the rule HREFs. You can do that by making an API call to the rule sets API for this rule set or using the developer console.

Disabling Flow Logging

Disable flow logging for the given rule by making a PUT request to the sec_rules API with the property l**log_flow** set to **false**.

Execute a cURL and an HREF:

```
curl -X PUT -u $API_USER:$API_PASS -H 'Content-type: applica-
tion/json' --data-raw '{ "log_flow": false }' $PCE_URL/api/v2/
orgs/1/sec_policy/draft/rule_sets/3/sec_rules/
```

Use a GET command to verify that the property is now **false**.

```
curl -u $API_USER:$API_PASS -H 'Content-type: applica-
tion/json' $PCE_URL/api/v2/orgs/1/sec_policy/draft/rule_sets/3/
sec_rules/3 | jq '.'
```

Provision the ruleset, and the No Log rules will be sent to the relevant VENs.

Showing Rule ID in Syslog

For large customers handling 10K+ messages per second, including rule IDs in the Syslog events will substantially increase the volume of recorded data.

New Feature: Added the organization-level feature flag `rule_info_exposure_to_syslog` (disabled by default) in release 25.1.0. This flag controls whether rule ID information is included in syslog messages.

Adding the Rule ID to Syslog Events

To add the rule IDs to the syslog events, the API `optional_features` was changed by adding the new property `rule_info_exposure_to_syslog`:

```
{
  "$schema": "http://json-schema.org/draft-04/schema#",
  "type": "array",
  "items": {
    "oneOf": [
      {
        "type": "object",
        "additionalProperties": false,
        "required": [
          "name",
          "enabled"
        ],
        "properties": {
          "name": {
            "description": "Name of the feature",
            "type": "string",
            "enum": [
              "ip_forwarding_firewall_setting",
              "ui_analytics",
              "illumination_classic",
              "ransomware_readiness_dashboard",
              "per_rule_flow_log_setting",
              "lightning_default",
              "collector_scanner_filters",
              "corporate_ips_groups",
              "labels_editing_warning_for_enforcement_mode",
              "label_based_network_detection",
              "cloudsecure_enabled",
              "windows_outbound_process_enforcement",
              "rule_based_label_mapping",
              "core_insights",
              "rule_info_exposure_to_syslog"
            ]
  ==============================================
```

To enable this feature flag, set the `firewall_settings.enable_all_rule_hit_count_enabled` option. This will instruct the VEN to send the rule IDs and the traffic flow payload to the PCE.

```
PUT /api/v2/orgs/:org_id/optional_features
payload
[
    {
        "name":"rule_info_exposure_to_syslog",
        "enabled":*true*
    }
]
```

Enabling the Rule Data

Before implementing the property `rule_info_exposure_to_syslog` , you must update the firewall settings and set the flag `enable_all_rule_hit_count_enabled=true;`.

This can be done using the API or the PCE console.

Setting the flag via the PCE console is explained in Events Administration Guide.

To set the flag `enable_all_rule_hit_count_enabled` via API, use the following command:

```
curl -u api_${ILO_API_KEY_ID}:${ILO_API_KEY_SECRET}
-H "Content-Type: application/json" -X
PUT -d '{"rule_hit_count_enabled_scopes":
[[]]}' https://${ILO_SERVER}/api/v2/orgs/${ILO_ORG_ID}/
sec_policy/draft/firewall_settings
```

Session Credentials Reference

This topic provides examples of session credentials use.

Examples

Retrieve a Token

This curl example shows how SaaS local users can use the Illumio Login Service (SAML ID for Remote Users)

```
curl -i -X POST https://login.illum.io:443/api/v2/
login_users/authenticate?pce_fqdn=scp1.illum.io -u
joe_user@example.com:'password' -H "Content-Type: application/
json"
```

Illumio on-premises solutions do not use a login server, so the curl command will look like this:

```
curl -i -X POST -u joe_user@my-
company.com:password https://pce.my-company.com:8443/api/v2/
login_users/authenticate?pce_fqdn=pce.my-company.com -H
"Content-Type: application/json"
```

Response Body to Authenticate with Login Service

The response for the Login Users API is an authentication token (in blue font):

```
{ "auth_token":"xxxxxxxxxxxxxxxxxxxxxxw89QutJ5WLntqz5jUrI2guA1rZ
JXKfcbwuF" }
```

Parameters to create session credentials

Login Service authentication token you obtained using the Login Users API.

Login Users API JSON Schema

This API uses the Illumio Segmentation for Data Centers schema `users_log-in_get.schema.json`.

Create Session Token

```
curl -i -X GET https://pce.my-company.com:8443/api/v2/
users/login -H "Authorization: Token
token=ntqz5jUrI2guA1XzUiLCJlbmMiOiJBMTI4Q0JDLUhZJ"
```

Response Body

`GET /users/login` returns a temporary `auth_username` and `session_to-ken`.

These are used in the curl examples as `$KEY:$TOKEN` respectively (if you're not using persistent API credentials).

Example: `-u user_4:'xxxxxxxx628f5773c47b72dbcd437b4a10d85a06a'`

```
{
    "full_name": "Buford T. Justice",
    "local": true,
    "type": "local",
    "href": "/users/4",
    "auth_username": "user_4",
    "inactivity_expiration_minutes": 10,
    "start": "2017-10-12 16:49:49 UTC",
    "time_zone": "America/Los_Angeles",
    "last_login_ip_address": "209.37.96.18",
    "last_login_on": "2020-10-12T16:49:49.000Z",
    "certificate": {
        "expiration": "2020-11-27T03:09:00.000Z",
        "generated": false
    },
    "login_url": "https://devtest166.ilabs.io:8443/login",
    "orgs": [
        {
            "org_id": 1,
            "org_href": "/orgs/1",
            "display_name": "illum.io",
            "role_scopes": [
                {
                    "role": {
                        "href": "/orgs/1/roles/owner"
                    },
                    "scope": [],
                    "href": "/orgs/1/users/4/role_scopes/4"
                }
            ]
        }
    ],
    "session_token": "xxxxxxxx628f5773c47b72dbcd437b4a10d85a0",
    "version_tag":
"60.1.0-9701f78bef46f521e3d6dd98f70cd8c220940885",
    "version_date": "Tue Sep 12 11:12:46 2020 -0700",
    "product_version": {
        "version": "17.1.1",
        "build": "6168",
        "long_display": "17.1.1-6168",
        "short_display": "17.1.1"
    }
}
```


Optional Feature Schema: `optional_feature.schema.json`

```
{
    "$schema": "http://json-schema.org/draft-04/schema#",
    "type": "object",
    "additionalProperties": false,
    "description": "PCE Feature",
    "required": [
        "name",
        "enabled"
        ],
    "properties": {
        "name": {
            "type": "string",
            "description": "The name of the feature"
        },
        "preview": {
            "type": "boolean",
            "description": "Is this a preview feature"
        },
        "enabled": {
            "type": "boolean",
            "description": "Is this feature enabled"
        }
    }
}
```

Get the optional features collection: `optional_features_get`

```
{
    "$schema": "http://json-schema.org/draft-04/schema#",
    "type": "array",
    "items": {
            "$ref": "optional_feature.schema.json"
        }
    }
```

Set the optional features for an organization: `optional_features_put`

The example shows the properties available in the release 24.1.1, which includes the property `rule_based_label_mapping`.

This property was added to support the new APIs presented in Rule-Based Label Mapping.

```
{
    "$schema": "http://json-schema.org/draft-04/schema#",
    "type": "array",
    "items": {
       "oneOf": [
        {
        "type": "object",
        "additionalProperties": false,
        "required": [
            "name",
            "enabled"
        ],
        "properties": {
            "name": {
            "description": "Name of the feature",
            "type": "string",
            "enum": [
                "ip_forwarding_firewall_setting",
                "ui_analytics",
                "illumination_classic",
                "ransomware_readiness_dashboard",
                "per_rule_flow_log_setting",
                "lightning_default",
                "collector_scanner_filters",
                "corporate_ips_groups",
                "labels_editing_warning_for_enforcement_mode",
                "label_based_network_detection",
                "cloudsecure_enabled",
                "windows_outbound_process_enforcement",
                "rule_based_label_mapping"
            ]
        },
        "enabled": {
            "description": "Enable or disable this feature",
            "type": "boolean"
        }
       }
    },
    {
        "type": "object",
        "additionalProperties": false,
        "required": [
            "name",
        "enabled"
        ],
        "properties": {
```

```
        "name": {
            "description": "Name of the feature",
            "type": "string",
            "enum": [
            "editable_dns_client_rule",
            "editable_dhcp_client_rule"
            ]
        },
        "enabled": {
            "description": "Enable or disable this feature",
            "type": "boolean"
        },
        "key": {
            "description": "Key required to enable the
feature. Contact Illumio Support for more details.",
                "type": "string"
                }
            }
            }
        ]
        }
    }
```

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 provide persistent authentication
- Session credentials 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 take effect upon 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 configuring 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. [57]
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 you configure three LDAP servers in the following 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, and 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 PCE's local certificate store.

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 instructions on enabling 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

LDAP Configuration

This section explains how to configure an LDAP server.

Configure Secure LDAP

To configure an LDAP server in the PCE, you need to configure LDAP for SSL authentication.

You can secure LDAP with SSL/TLS Certificates using these three methods:

- Use PCE Web UI to Configure Secure LDAP
- Install LDAP TLS Certificates from the PCE Command-Line to the PCE System CA Store.
- Configure LDAP for SSL authentication using REST APIs

Configure LDAP for SSL authentication

The following APIs are used to configure LDAP for SSL:

- `GET /authentication_settings/ldap_configs`
- `GET /authentication_settings/ldap_configs/:uuid`
- `POST /authentication_settings/ldap_configs`
- `PUT /authentication_settings/ldap_configs/:uuid`

The required property is `tls_ca_bundle`.

To manage TLS CA bundle for LDAP authentication, use these APIs:

- `GET /login_proxy_ldap_configs`
- `POST /login_proxy_ldap_configs`
- `PUT /login_proxy_ldap_configs/update`

Update LDAP configuration

This section outlines how to update the LDAP server configuration in the PCE.

```
PUT /api/v2/authentication_settings/ldap_configs/:uuid
```

where `uuid` indicates the LDAP server configuration UUID.

Request body:

```
{
        "address" :  "ldap-1.mycompany.com" ,
        "bind_password" :  "qw3r!y123!!" ,
       "full_name_attribute" :  "displayName" ,
        "port" : 636,
        "insecure_disable_tls_certificate_verification": true
}
```

Response:

The following response codes can be returned:

- 204: indicates success
- 403: indicates the user is not an org owner
- 404: indicates LDAP configuration not found or an attempt to update LDAP configuration in another domain
- 406: indicates invalid parameters

Delete LDAP Server Configuration

This API deletes the configuration for an LDAP server in the PCE. For information about the request parameters, see LDAP Configuration Parameters Overview.

```
DELETE /api/v2/authentication_settings/ldap_configs/:uuid
```

where `uuid` indicates the LDAP server configuration `uuid`

Request body: none

Response:

The following response codes can be returned:

- 204: indicates success
- 403: indicates the user is not an org owner
- 404: indicates LDAP configuration not found or an attempt to update LDAP configuration in another domain
- 406: indicates invalid parameters

LDAP Use Cases and Testing

This section provides some LDAP use cases and testing procedures.

Configure LDAP for SSL authentication

Use case 1:

Retrieve all LDAP configurations for the domain.

1. Request format:`GET /api/v2/authentication_settings/ldap_configs`
2. Possible parameters (drawn from REST API conventions):
   - Required: none
3. Request Body: none
4. Response format: JSON
5. Response Code: 200 success

Use case 2:

Create LDAP server configuration.

1. Request format: POST /api/v2/authentication_settings/ldap_configs
2. Possible parameters (drawn somewhat from REST API Conventions):
   - Required: none
   - Optional: none
3. Request Body:

   Single-PCE

```
{
        "name": "ldap 1",
        "address": "ldap-1.ilabs.io",
        "port": "10636",
        "authentication_method": "LDAPS",
        "request_timeout_seconds": 4,
        "bind_distinguished_name":
'CN=admin,CN=Users,DC=ilabs,DC=io',
        "bind_password": 'test1234',
        "user_base_distinguished_name": 'DC=ilabs,DC=io',
        "username_attribute": 'sAMAccountName',
        "full_name_attribute": 'cn',
        "user_memberof_attribute": 'memberof',
        "tls_ca_bundle": "
        -----BEGIN CERTIFICATE-----

MIIDhTCCAm2gAwIBAgIQYx+dZzQPBLdN6e8uqW2ByDANBgkqhkiG9w0BAQ0FA
DBJ
        ..........................................................
............
        -----END CERTIFICATE-----
        -----BEGIN CERTIFICATE-----

MIIF7TCCBNWgAwIBAgITEgAAAEg0ToOKIywtOQAAAAAASDANBgkqhkiG9w0BA
Q0F
        ..........................................................
.............................
        -----END CERTIFICATE-----"
       }
```

   Supercluster

```
{
        "pce_fqdn": "devmr01",
        "name": "ldap 1",
        "address": "ldap-1.ilabs.io",
        "port": "10636",
        "authentication_method": "LDAPS",
        "request_timeout_seconds": 4,
        "bind_distinguished_name":
'CN=admin,CN=Users,DC=ilabs,DC=io',
        "bind_password": 'test1234',
        "user_base_distinguished_name": 'DC=ilabs,DC=io',
        "username_attribute": 'sAMAccountName',
        "full_name_attribute": 'cn',
        "user_memberof_attribute": 'memberof',
        "tls_ca_bundle": "-----BEGIN CERTIFICATE-----

MIIDhTCCAm2gAwIBAgIQYx+dZzQPBLdN6e8uqW2ByDANBgkqhkiG9w0BAQ0FA
DBJ
        -----END CERTIFICATE-----
        -----BEGIN CERTIFICATE-----

MIIF7TCCBNWgAwIBAgITEgAAAEg0ToOKIywtOQAAAAAASDANBgkqhkiG9w0BA
Q0F
        -----END CERTIFICATE-----"
}
```

4. Response format: JSON
5. Response Code:

- 204 success
- 403 not an org owner
- 406 invalid params

Use case 3:

Update LDAP server configuration:

1. Request format: `PUT /api/v2/authentication_settings/ldap_configs/:uuid`
2. Possible parameters (drawn somewhat from REST API Conventions):
   - Required: uuid - LDAP server configuration UUID
   - Optional: none
3. Request Body:

```
{
"tls_ca_bundle":"
-----BEGIN CERTIFICATE-----
-----END CERTIFICATE-----
-----BEGIN CERTIFICATE------
----END CERTIFICATE-----"
}
```

4. Response format: JSON
5. Response Codes:

- 204 success
- 403 not an org owner
- 404 LDAP config not found, or attempt to update LDAP config in another domain
- 406 invalid params

Test LDAP Server Connectivity

This section outlines how to use the API to verify the connectivity of a PCE-configured LDAP server.

```
POST /api/v2/authentication_settings/ldap_configs/:uuid/
verify_connection
```

where `uuid` indicates the LDAP server configuration UUID.

Request body: none

Response body:

If a server connection is verified successfully:

```
{
    "verified" :  true
}
```

If the server connection verification fails:

```
{
    "verified" :  false ,
    "errors" : [
    {
    "token" :  "ldap_server_verification_failure" ,
    "message" :  "LDAP server verification failure:  LDAP
server error message"
    }
]
```

Mapping Group Membership for LDAP

This section explains how to map group membership to user roles.

You must first configure the PCE to use LDAP authentication and then map PCE roles to that server's groups.

When a user attempts to log in, the PCE queries the server(s) to find that user. It grants the user permissions based on any roles associated with the LDAP groups to which the user belongs.

You have the following options for changing user permissions:

- For a group of users, remap the LDAP group to a different PCE role.
- For an individual user, move the user to an LDAP group mapped to a different PCE role using the LDAP server.

You can also perform these user management activities:

- Add a user to a PCE role.
  On the PCE, map the PCE role to an LDAP group.
  On your LDAP server, add the user to that LDAP group.
- Remove a user from a PCE role by removing it from the corresponding LDAP group on your LDAP server.

Users can have memberships in several roles, which give them access to all the capabilities available for each role.

For example, a user is a member of both the **docs** and **eng** groups, and the **docs** group is mapped to "Ruleset Manager" while the **eng** group is mapped to "Ruleset Provisioner." In this case, the user obtains all permissions assigned to the "Ruleset Manager" and "Ruleset Provisioner" roles.

NOTE

The PCE checks LDAP membership information when a user attempts to log in.

You do not need to reload the authentication configuration when adding or removing users.

Machine Authentication

This Public Experimental API allows you to configure unmanaged workloads and rules for machine authentication if you have 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 on which you want to use machine authentication with the client certificate X.509 Subject distinguished name (`distinguished_name`) issued by the CA. You do not need to set this property using machine authentication with managed workloads (with VENs installed).
- Configure machine authentication rules 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 as 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.

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]
```

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.

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]
```

Configure Machine Authentication on an Existing Rule

This topic covers flags to enable machine authentication and SecureConnect encryption for the rule.

Table 3. Flags for machine authentication

Parameter	Description
`machine_auth`	An optional boolean flag, set to true, enables machine authentication for the rule.
`sec_connect`	An optional boolean flag enables SecureConnect (host-to-host traffic encryption) for the rule.

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,
    "destinations": [{
        "actors": "ams"
    }],
    "consuming_security_principals": [],
    "unscoped_destinations": false,
    "description": "",
    "ingress_services": [{"proto": 6}],
    "resolve_labels_as": {
      "providers": ["workloads"],
      "destinations": ["workloads"]
    },
    "enabled": true,
    "machine_auth": true
}
```

Configure Machine Authentication for a 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, "destinations":
[{"actors":"ams"}],"consuming_security_principals":[],
"ingress_services": [{"proto": 6}],
unscoped_destinations":false,
"description":","resolve_labels_as":{"providers":
["workloads"],"destinations":
["workloads"]},"enabled":true,"machine_auth":true}'"destinatio
ns":[{"actors":"ams"}],"consuming_security_principals":[],
"ingress_services": [{"proto": 6}],
unscoped_destinations":false,
"description":","resolve_labels_as":{"providers":
["workloads"],"destinations":
["workloads"]},"enabled":true,"machine_auth":true}'
```

REST API Users

This Public Stable API allows you to log your User into the PCE, enabling you to obtain a session token to access other 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]/log-in_users/authenticate
Create a new user.	POST	[api_version][users]
Log in as 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 the user's information.	PUT	[api_version][user_href]
Change a user's password (a local, non-SSO user).	PUT	[api_version]/log-in_users/[user_href]/password

Log In to the PCE

URI to Log In User

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

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, including the time 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 are not available for use.

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.

Required Permissions for API Users

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

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	He performs all actions except that he cannot change organization settings 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, 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. You can add, edit, and delete rules when the Source matches the specified scope. The rule Destination 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 Source and Destination match the specified scope. Ruleset Managers with limited privileges cannot manage rules that use IP lists, user groups, label groups, or iptables rules as destinations, 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 lists, services, or label groups.

REST API Users Reference

This topic covers properties, parameters, and examples for REST API users

Properties

Property	Description	Type
`href`	URI of the user.	String
`username`	Username used for authentication.	String
`last_login_on`	When the user logged on.	String
`last_login_ip_address`	The IP address of the system where the user has logged into the PCE.	String
`login_count`	The number of times the user has logged in.	Integer
`full_name`	Full name of a user as listed in the PCE web console.	String
`time_zone`	User's timezone IANA Region name.	String
`locked`	Indicates if a user account is locked or not. True = locked.	Boolean
`effective_groups`	A list of group names to which the user belongs.	String
`local profile`	Local user profile	Object
`updated_at`	Date when user account information was last updated in the system.	String
`created_at`	Date when the user account was created in the system.	String
`type`	Indicates if the PCE authenticates the user account.	String
	(`local`) or by a third party SAML-based identity management system (`external`)	
`one_time_password`	The time-based one-time password for two-factor authentication. This password is required in addition to username and password for authentication.	String

Request Example

```
GET https://pce.my-company.com:8443/api/v2/users/5
```

Get a User's Information

```
curl -i -X GET https://pce.my-company.com:8443/api/v2/users/14
-H "Accept: application/json" -u $KEY:$TOKEN
```

Response Body

In this response, the user is represented in the system by an HREF path property (`"href": "/users/14"`), which can be used when you want to update the user information.

```
{
    "href": "/users/14",
    "type": "local",
    "effective_groups": [],
    "id": 14,
    "username": "joe.user@pce.my-company.com",
    "full_name": "Ralph W. Emerson",
    "time_zone": "America/Los_Angeles",
    "locked": false,
    "login_count": 75,
    "last_login_ip_address": "xxx.37.96.18",
    "last_login_on": "2020-08-17T15:42:25.732Z",
    "local_profile": {
        "pending_invitation": false
    },
    "created_at": "2019-10-26T05:24:08.735Z",
    "updated_at": "2019-08-17T15:55:40.130Z"
}
```

Request Body for REST API users

Property	Description	Type	Required
`full_name`	User's full name.	String	No
`username`	`username` is an e-mail address such as `user@example.com`	String	Yes
`type`	User's type, such as user authenticated as local.	String	Yes
`time_zone`	The user's timezone IANA region name.	String	No

Create a User

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

Possible Responses

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

- `204 success`: A new local user was created successfully.
- `406`: Validation error such as `invalid`.
- 501: The user has been created, but the invitation email failed. The new user cannot register or sign up. If you receive this message, you need to create another local user.

Resend Invitation for a Local User

To resend the invitation to a new local user after an e-mail notification failure, use the following URI:

```
PUT /users/:user_id/local_profile/reinvite
```

Update User Information

This API updates an Illumio API user's account information.

URI to Update User's Information

```
PUT [api_version][user_href]
```

Request Body

The request body is an empty JSON object.

```
{}
```

If you attempt to use a PUT with that URL without a payload, the 406 error shows `No payload provided for PUT request`.

Property	Description	Type	Optional
`full_name`	User's full name	String	Yes
`time_zone`	The user's time zone IANA region name	String	Yes

Log Out a User

Use PUT to log out a user:

```
    "logout": {
           "http_method": "PUT",
           "path": "/users/:id/logout",
           "summary": "Logout a specific user and destroy the
access token",
```

Curl Command to log out a User

```
curl -i -X PUT https://pce.my-company.com:8443/api/v2/users/
12345678/logout -H "Content-Type: application/json" -u
$KEY:$TOKEN
```

where "12345678" is the user ID.

URI to Change the User's Password

```
PUT [api_version]/login_users/[user_href]/password
```

Request Body

Property	Description	Type	Required
`password`	User's new password must meet these requirements: • Have a minimum of 8 characters • Have at least 1 capital letter • Have at least 1 lowercase letter • Have at least 1 number • Not match previously used passwords	String	Yes

Example Request Body

```
{
     "password":"'new_password'"
}
```

Change the User's Password

```
curl -u 'username'@'company'.com:'existing_password'
-X PUT https://'company'.com:8443/api/v2/login_users/me/
password -H "Content-type: application/json" -d
'{"password":"'new_password'"}' -i
```

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"). This will execute the request as an offline job.

Async Job Operations

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

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

Setting this preference executes the request as an asynchronous job in the background during low-traffic times, 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
```

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 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"
  }
}
```

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"). This will execute the request as an offline job.

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
```

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 the results
`result`	Query result	Object (HREF, not required)	Yes
`requested_at`	Time PCE received the request	Date-time	Yes
`requested_by`	The user who initiated the request	Object (HREF, required)	Yes
`terminated_at`	Termination time of the job (regardless of outcome)	Date-time	Yes
`status`	Status of the asynchronous request	Enum (`done`, `pending`, `running`, or `failed`)	Yes
`created_by`	Creator of the 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
```

Overview of Async GET Requests

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

REST Patterns for Collection vs. Instance

GET collection methods return HREF path properties for each individual resource. Perform other REST operations on individual instances of these resources (such as POST, PUT, and DELETE) using the HREF to identify the resources on which 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: "2014-01-22T18:24:33Z"
    updated_at: "2014-01-22T18:24:40Z"
    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/network_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/security_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

Description	Resource Type	Exposure
dependencies	`GET [api_version][org_href]/sec_policy/draft/dependencies`	Experimental
ip_lists	`GET [api_version][org_href]/sec_policy/draft/ip_lists`	Both
label_groups	`GET [api_version][org_href]/sec_policy/draft/label_groups`	Experimental
label_groups/member-of	`GET [api_version][org_href]/sec_policy/draft/label_groups/member-of`	Experimental
modified_objects	`GET [api_version][org_href]/sec_policy/draft/modified_objects`	Experimental
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/virtaual_services`	Both
settings/		
settings	`GET [api_version][org_href]/settings`	
syslog/destinations	`GET [api_version][org_href]/settings/syslog/destinations`	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/		

Description	Resource Type	Exposure
workloads/	`GET [api_version][org_href]/workloads`	Both
interfaces	`GET [api_version][org_href]/workloads/interfaces`	Both

About 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.

Using PCE, administrators can also manage organization settings, container clusters, events, and access restrictions.

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 with an option to sign authN requests.

API Methods for Authentication Settings

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 IdP will use 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 IdP will use 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.

Authentication Settings Reference

This topic covers examples of authentication settings.

Examples

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`

Password Policy Reference

This topic covers properties, parameters, and examples of 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
}
```

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_characters_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`	The 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 The policy was last updated and automatically recorded by the system.	date-time String	Yes

Parameter	Description	Type	Req
`updated_by`	The username of the person who last updated this is 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}
```

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

Parameters

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`	The 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
}
```

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 Segmentation for Data Centers PCE installed on-premises and not for Cloud customers.

About PCE Health API

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

- How long has the PCE been running? What is its runlevel? What is its overall health (normal, warning, or error)?
- Each node hostname, IP address, uptime, runlevel, and whether the PCE software runs properly.
- Each node type (core or data) indicates whether the data node is the database replica or 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, is provided 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
```

PCE Health Reference

This topic covers properties, parameters, and examples for PCE health.

Check PCE Health

Curl Command

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

Properties

Property	Description	Type

`status`	Current health status of the PCE. Possible values:
	
	• `normal`: When a PCE's health is in 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 PCE Administration Guide.	String

Property	Description	Type
`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. For more information about runlevels and their usage, see PCE Administration Guide. • `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`. • `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 statuses 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.	String
`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 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 provides database replication latency information for a PCE cluster. (For a PCE Supercluster, this information is provided for each PCE in the Supercluster.)	Array

Property	Description	Type

	• `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:
	
	`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

Example response 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"
    }
]
```

No Op

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

Node Availability Reference

This topic covers parameters, properties, and examples of node availability.

Examples

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 can see at least one 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`.

Parameters for support bundle requests

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	String	No
`requested_at`	A time support bundle was 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 the associated report file Reference to `common/href_object.schema.json`		Yes
`requested_at`	A time support bundle was 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
}
```

Organization Setting Management

Flags manage organization settings for automatic clone activation and reactivation, and for obtaining permissions from the Census API or a local database.

Enabling clone detection

Users sometimes need to disable clone detection as a safety valve. For example, if a customer has workloads in a particular environment that behave unexpectedly, they might end up with runaway clones being activated.

Functionality	HTTP	Properties Added	URI

This is for VEN or URI to fetch the current clone detection settings.
 	
Authorization is for the org user and the interservice.
	`GET`	`automatic_clone_ reactivation`
		
		`clone_detection_ enabled`
			`/api/v2/orgs/:xorg_id/settings`

This is for the org admin to set new clone detection settings.
 	
Authorization is for the org admin.
	`PUT`	`automatic_clone_ reactivation`
		
		`clone_detection _ enabled`
			`/api/v2/orgs/:xorg_id/settings`

Two properties have been added to the schemas `settings_get` and `settings_put`:

- `clone_detection_enabled`
- `automatic_clone_reactivation`

Depending on whether they are added to the PUT or GET method, they require different types of authorization: org admin for PUT and org user or inter-service authorization for GET.

- If `automatic_clone_reactivation` is `disabled`, there is no automatic clone reactivation.

Census

A new property `use_census_permissions` was added to the schemas `settings_get` and `settings_put` to indicate whether PCE will obtain permissions from the Census API or a local database.

The flag is set to `TRUE` to get permissions from the census and to `FALSE` for the local database.

Functionality	HTTP	Properties Added	URI

This flag indicates whether the PCE will obtain permissions from the census or a local database.	`GET`
	
	`PUT`
		`use_census_permissions`	`/api/v2/orgs/:xorg_id/ settings`

Organization Settings Reference

This topic covers examples of organizational settings.

Examples

Example JSON Response Body for Get Events Settings

```
{
    "audit_event_retention_seconds": 180,
    "audit_event_min_severity": "informational",
    "format": "JSON"
}
```

Update Events Settings

Example JSON Request Body for Update Events

```
{
    "audit_event_retention_seconds": 90,
    "audit_event_min_severity": "informational"
}
```

Example JSON Response Body with Local and Remote Syslog Location Information

```
[
    {
        "href": "/api/v2/orgs/1/settings/syslog/destinations/
xxxxxxxx-xxxx-xxxx-xxxx-xxxxxxxxxxxx",
        "pce_scope": [ "remote-my-company0.com", "remote-my-
company1.com" ],
        "type": "remote_syslog",
        "description": "remotesyslog",
        "audit_event_logger": {
            "configuration_event_included": true,
            "system_event_included": false,
            "min_severity": "warning"
        },
        "traffic_event_logger": {
            "traffic_flow_allowed_event_included": true,
            "traffic_flow_potentially_blocked_event_included":
true,
            "traffic_flow_blocked_event_included": true
        },
        "node_status_logger": {
            "node_status_included": true
        },
        "remote_syslog": {
            "address"  : "my-company-20.com",
            "port"     : 12345,
            "protocol" : 6,
            "tls_enabled"     : false,
            "tls_verify_cert" : false
        }
    }
]
```

Example JSON Response Body with Remote Syslog Location Information

```
{
    "href": "/api/v2/orgs/1/settings/syslog/destinations/
xxxxxxxx-xxxx-xxxx-xxxx-xxxxxxxxxxxx",
    "pce_scope": [ "remote-my-company0.com", "remote-my-
company1.com" ],
    "type": "remote_syslog",
    "description": "remotesyslog",
    "audit_event_logger": {
        "configuration_event_included": true,
        "system_event_included": false,
        "min_severity": "warning"
    },
    "traffic_event_logger": {
        "traffic_flow_allowed_event_included": true,
        "traffic_flow_potentially_blocked_event_included":
true,
        "traffic_flow_blocked_event_included": true
    },
    "node_status_logger": {
        "node_status_included": true
    },
    "remote_syslog": {
        "address"  : "my-company-20.com",
        "port"     : 12345,
        "protocol" : 6,
        "tls_enabled"     : false,
        "tls_verify_cert" : false
    }
}
```

Example JSON Request Body to Create a Remote Syslog Destination

```
{
    "pce_scope": [ "my-company0.com", "my-company1.com", "my-
company2.com" ],
    "type": "remote_syslog",
    "description": "remote syslog",
    "audit_event_logger": {
        "configuration_event_included": true,
        "system_event_included": false,
        "min_severity": "warning"
    },
    "traffic_event_logger": {
       "traffic_flow_allowed_event_included": true,
       "traffic_flow_potentially_blocked_event_included": true,
       "traffic_flow_blocked_event_included": true
    },
    "node_status_logger": {
        "node_status_included": true
    },
    "remote_syslog": {
        "address"  : "my-company-20.com",
        "port"     : 12345,
        "protocol" : 6,
        "tls_enabled"     : false,
        "tls_verify_cert" : false
    }
}
```

Example JSON Request Body to Update a Syslog Destination

```
{
    "href": "/api/v2/orgs/1/settings/syslog/destinations/
xxxxxxxx-xxxx-xxxx-xxxx-xxxxxxxxxxxx",
    "pce_scope": [ "my-company0.com", "my-company1.com", "my-
company2.com"  ],
    "type": "remote_syslog",
    "description": "localhost syslog",
    "audit_event_logger": {
        "configuration_event_included": true,
        "system_event_included": true,
        "min_severity": "informational"
    },
    "traffic_event_logger": {
       "traffic_flow_allowed_event_included": true,
       "traffic_flow_potentially_blocked_event_included": true,
       "traffic_flow_blocked_event_included": true
    },
    "node_status_logger": {
        "node_status_included": false
    },
    "remote_syslog": {
        "address"  : "my-company-20.com",
        "port"     : 67890,
        "protocol" : 6,
        "tls_enabled"     : false,
        "tls_verify_cert" : false
    }
}
```

Examples for Enabling clone detection:

(Only new fields in the schema `settings_get` are shown)

```
"clone_detection_enabled": {
    "description": "When true, clone detection is done for
this org",
    "type": "boolean"
   },
    "automatic_clone_reactivation": {
    "description": "When true, automatic clone reactivation
should be done on clone detection for this org",
    "type": "string",
    "enum": [ "disabled",
"windows_domain_joined_workloads_only" ]
}
```

Example reply (only for `"clone_detection_enabled"`)

```
{
    "clone_detection_enabled": true,
    "automatic_clone_reactivation":
"windows_domain_joined_workloads_only"
}
```

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

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]
```

Events Reference

This topic covers properties, parameters, and examples of events.

Parameters

Parameter	Description	Type
`xorg_id`	Organization ID in which the event occurred.	Integer
`created_by`	Information about the person, agent, or system that created the event. Created by *system*: • `system`: Appears only if the event was generated by the PCE. Created by *user* properties: • `href`: URI of the user who created the event. • `username`: The user name (usually formatted as an e-mail address). Created by *workload* properties: • `href`: URI of the agent on the workload that initiated the event. • `hostname`: The hostname of the workload.	String
`event_type`	The type of the event specified by the `event_type` query parameter if given. If no query parameters are given, all event types are returned. See the response properties table below for types of events returned from a GET call.	String
`max_results`	Maximum number of events to return. The default is 100, and the maximum is 10000.	Integer
`severity`	Severity level of the events retrieved. Values include: • Warning (`warning`): A warning that the event is likely to occur if action is not taken. • Error (`err`) • Information (`info`): Normal operational messages can be harvested for reporting and measuring throughput, such as user pairing or unpairing workloads in the PCE web console.	String
`status`	Status of the event, either `success` or `failure`.	String
`timestamp[gte]`	Event start timestamp in RFC 3339 format.	String

Parameter	Description	Type
`time-stamp[lte]`	Event end timestamp in RFC 3339 format.	String

Properties

Parameter	Description	Type
`event_type`	The type of the event specified by the `event_type` query parameter if given. If no query parameters are given, all event types are returned. See the response properties table below for types of events returned from a GET call.	String
`status`	Status of the event: usually a mapping of `api_status_code` to a generic result string; nil if no action. For presentation purposes only.	String
`severity`	Severity level of the events retrieved. Values include: • Warning (`warning`): A warning that the event is likely to occur if action is not taken. • Error (`err`) • Information (`info`): Normal operational messages can be harvested for reporting and measuring throughput, such as user pairing or unpairing workloads in the PCE web console.	String
`created_by`	Information about the person, agent, or system that created the event. Created by *system*: • `System` : This appears only if the PCE generated the event. Created by *user* properties: • `href`: URI of the user who created the event. • `username`: The user name (usually formatted as an e-mail address). Created by *workload* properties: • `href`: URI of the agent on the workload that initiated the event. • `hostname`: The hostname of the workload.	String

Examples

Curl Command to Get an Event

You need the ID of the system event you want to get, which is the number at the end of its HREF path property: `"/2/events/68632"`.

```
curl -i -X GET https://pce.my-company.com:8443/api/v2/orgs/2/
events/12345 -H "Accept: application/json" -u $KEY:$TOKEN
```

Curl Command Get Event Collection

In this example, only two events are returned because of `max_events=2`.

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

Example Response

```
[
  {
    "href": "/orgs/1/events/xxxxxxx-5f59-46ab-8f18-xxxxxxxxx",
    "timestamp": "2019-09-03T01:xx:xx.xxxZ",
    "pce_fqdn": "pce.my-company.com",
    "created_by": {
      "agent": {
        "href": "/orgs/1/agents/xxx",
        "hostname": "xxx-xxxxx-xxxx"
      }
    },
    "event_type": "agent.clone_detected",
    "status": null,
    "severity": "info",
    "action": null,
    "resource_changes": [],
    "notifications": [
      {
        "uuid": "xxxxxxx-e04b-43bc-a64a-xxxxxxxxxx",
        "notification_type": "agent.clone_detected",
        "info": {
          "agent": {
            "href": "/orgs/1/agents/xxx",
            "name": null,
            "hostname": "xxx-xxxxx-xxxx"
          }
        }
      }
    ]
  },
  {
    "href": "/orgs/1/events/xxxxxxx-60a2-4db4-b0f4-xxxxxxxxxx",
    "timestamp": "2019-09-03T0x:xx:xx.xxxZ",
    "pce_fqdn": "pce.my-company.com",
    "created_by": {
      "agent": {
        "href": "/orgs/1/agents/xxx",
        "hostname": "xxx-xxxxx-xxxx"
      }
    },
    ]
  }
]
```

Container Clusters

Illumio Segmentation for Data Centers 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 stores 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`

Container Cluster Workload Profiles

When you install an Illumio VEN on a container cluster, all pods are unmanaged or not visible in the PCE. However, Kubelink reports all namespaces on the container clusters, which are then visible via the Container Workload Profiles API.

Each container workload profile maps to a Kubernetes namespace and can be 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

Label Restrictions

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

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

1. No label will be assigned.
2. PCE will assign one label.
3. Using annotations, Kubernetes can assign a restricted list of labels. Label restrictions prevent Kubernetes platform administrators from unauthorized use of Illumio labels and ensure that labels inherit the correct policies.
4. Kubernetes can assign any label.

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`

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), two options:

Option 1: explicit statement

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

Option 2: empty payload

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

Backend Services Associated with Container Clusters

The Illumio policy model represents Kubernetes services as virtual services. For these services, Kubelink creates virtual services in the PCE and reports the list of Replication Controllers, Daemon Sets, and Replica Sets responsible for managing the pods that support them.

When 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 matches 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`

Kubernetes APIs

Kubernetes Workload Endpoints

Customers must see the details of Kubernetes workloads in PCE to 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 a 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`.
- `GET /api/v2/orgs/:xorg_id/kubernetes_workloads`
  For this API, these changes have been made in release 23.5.0:
  two arrays have been removed, `k8s_labels` and `sk8s_annotation`, and replaced with property `metadata`.
  HREF description has been changed from `URI of the container workload`, to `URI of the Kubernetes workload`.

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

- `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 labels. The minimum number is one.
- `common kubernetes_workloads_metadata`
  The new common schema `kubernetes_workloads_metadata` was added in release 23.5.0, referenced from `kubernetes_workload_get`.
  It provides Kubernetes properties, such as labels, annotations, and the UID of the external service.

Container Clusters Reference

This topic covers properties, parameters, and examples for container clusters.

Parameters

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 is used for this container cluster only in the Supercluster.	String	No
`cluster_mode`	The new property `cluster_mode` was added in 23.5.10 to describe the cluster mode for the container cluster. The default is `legacy`.	String	

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

Curl Command for GET

```
curl --request GET --url https://pce.my-
company.com:8443/api/v2/orgs/1/container_clusters --header
'authorization: Basic
YXBpXzE2YjBkYjI0MjJhZGNkYWU5OjA5ZmRjNjA4MDhiMzExZTc2Y2UyNzNmOWN
iN2ZhMTA5OTdkMWNlMDAzZmMzOTQ1ZGMxYzEwZGzlmZjM='
```

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
jI0MjJhZGNkYWU5OjA5ZmRjNjA4MDhiMzExZTc2Y2UyNzNmOWNiN2ZhMTA5OTdk
MWNlMDAzZmMzOTQ1ZGMxYzEwZGJhZTg5NzlmZjM=' --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
YXBpXzE2YjBkYjI0MjJhZGNkYWU5OjA5ZmRjNjA4MDhiMzExZTc2Y2UyNzNmOWN
iN2ZhMTA5OTdkMWNlMDAzZmMzOTQ1ZGMxYzEwZGJhZTg5NzlmZjM=' --
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_0dfec0acb8e4bc53e052874874da0c24e7ac98da3b3954e3c9ea6f986072
2e84"
}
```

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

Properties for container workload methods

Property	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	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

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
NjA4MDhiMzExZTc2Y2UyNzNmOWNiN2ZhMTA5OTdkMWNlMDAzZmMzOTQ1ZGMxYzE
wZGJhZTg5NzlmZjM=' --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
A5ZmRjNjA4MDhiMzExZTc2Y2UyNzNmOWNiN2ZhMTA5OTdkMWNlMDAzZmMzOTQ1Z
GMxYzEwZGJhZTg5NzlmZjM=' --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
mRjNjA4MDhiMzExZTc2Y2UyNzNmOWNiN2ZhMTA5OTdkMWNlMDAzZmMzOTQ1ZGMx
YzEwZGJhZTg5NzlmZjM=' --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

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
    },
    ...
]
```

Examples for label restrictions

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.

Properties

Backend services associated with container clusters

Property	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 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
YzE2YjBkYjI0MjJhZGNkYWU5OjA5ZmRjNjA4MDhiMzExZTc2Y2UyNzNmOWNiN2Z
hMTA5OTdkMWNlMDAzZmMzOTQ1ZGMxYzEwZGJhZTg5NzlmZjM='
```

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"
        }
    }
]
```


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

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

```
GET /api/v2/orgs/:xorg_id/kubernetes_workloads/:kuber-
netes_workload_uuid
```

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

```
common kubernetes_workloads_metadata
```

```
{
    "$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 Illumio Core for Kubernetes and OpenShift.

Supercluster Leader

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

About the Supercluster Leader API

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

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.

For more information, see PCE Supercluster Deployment Guide.

Get Supercluster Leader

```
GET [api_version]/supercluster/leaderCurl Command Get
Supercluster Leader
```

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

A 200 response follows the command:

```
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
```

Access Restrictions and Trusted Proxy IPs

To manage the PCE environment automatically, you can use API Keys created by an admin user to automate the PCE management tasks. Illumio provides a way to restrict the use of these API keys by IP address, allowing you to block API requests from non-authorized IP addresses.

Access Restrictions

Access restrictions are configurable entities containing up to 8 IPv4 IP addresses or CIDR blocks specifying the source IP addresses of allowed clients. Only the global organization owner can manage access restrictions within the organization, while other roles cannot edit or view them.

The following rules apply to access restrictions:

- Each access restriction can be applied to either one or both:
  - API keys authenticate API requests.
  - Username/Password credentials authenticate API requests.
- 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 supercluster 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 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 user session tokens).

The organization owners create and manage access restrictions within their organizations, ensuring a maximum of 50 access restrictions per organization. The organization owners can assign a single access restriction to each Local or External User (by default, no access restriction is 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 for `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`	An 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

Trusted Proxy IPs

When a client is connected to the PCE's 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 client's actual public IP address.

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. This header's value is a comma-separated list of one or more IP addresses, with the source IP address seen by the most recent proxy listed last.

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.

This setting allows the organization owner to designate the trusted proxies/intermediaries. 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`
Inter-service 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 query 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 property) `max_trusted_proxy_ips_per_region`	`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`	Required: `pce_fqdn`: FQDN of PCE region, or null if not in supercluster `ip:`IP address or CIDR trusted for handling	Yes

Organization Access

Changes to the organization access introduced a new common schema:

common ipv4_ipv6_subnet

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`

Access Restrictions Reference

This topic covers examples of access restriction.

Examples

Create 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 Acess 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"
}
}
```

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"
            }
        }
        }
    }
    }
```

Policy

Creating a security policy is an iterative process; following these recommendations will provide a broad initial policy, which can be incrementally improved until a sufficiently robust policy is established.

You can write policies that enable the workloads in your application to communicate effectively.

A policy consists of rules and scopes:

- Rules define which workloads are allowed to communicate.
- Scopes define to which workloads the rules are applied.

Rules

This Public Stable API creates, updates, and deletes individual rules in rule-sets.

It also gets a collection of rules from a ruleset.

Illumio Segmentation for Data Centers 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.

Rules API Methods

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

Table 4. API Methods for Rules

Functionality	HTTP	URI
Get rules	GET	sec_policy_rule_sets_sec_rules
Get rules for providers.	GET	sec_policy_rule_sets_sec_rules_providers
Get rules for destinations.	GET	sec_policy_rule_sets_sec_rules_destination
Update rules	PUT	sec_policy_rule_sets_sec_rules
Update rules for providers	PUT	sec_policy_rule_sets_sec_rules_providers
Update rules for destinations	PUT	sec_policy_rule_sets_sec_rules_destinations
Create rules	POST	sec_policy_rule_sets_sec_rules
Delete an individual rule.	DELETE	sec_rule_href

Rule Types

Illumio's security policy includes three rule types: intra-scope rules, extra-scope rules, and custom iptables rules:

- **Intra-scope rules** allow communication between Sources and Destinations within a specific scope.
- **Extra-scope rules** permit communication between applications. You can write rules so that destinations 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 Source.

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.

Deny Rules

This API gets, creates, updates, and deletes deny rules. Deny rules deny communication between sources and destinations.

Deny Rules API Methods

Functionality	HTTP	URI
Get a collection of deny rules.	`GET`	`[api_version][org_href]/sec_policy/:pversion/rule_sets/:rule_set_id/deny_rules`
Get a specified deny rule instance.	`GET`	`[api_version][org_href]/sec_policy/:pversion/rule_sets/:rule_set_id/deny_rules/:deny_rule_id`
Create a deny rule.	`POST`	`[api_version][org_href]/sec_policy/:pversion/rule_sets/:rule_set_id/deny_rules`
Update a specified deny rule.	`PUT`	`[api_version][org_href]/sec_policy/:pversion/rule_sets/:rule_set_id/deny_rules/:deny_rule_id`
Delete a specified deny rule.	`DELETE`	`[api_version][org_href]/sec_policy/:pversion/rule_sets/:rule_set_id/deny_rules/:deny_rule_id`

Rule Search

This Public Experimental method searches for rules across all rulesets. This method is especially useful when your organization has many rules organized in rulesets.

For example, your organization has 192,000 rules organized across 650 rule-sets, and you need to know how many rules are 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.

Rule Search Methods

Table 5. Rule Search Methods

Functionality	HTTP	URI
Create rule search	POST	`/api/v2/orgs/:xorg_id/sec_policy/:pversion/rule_search`

Rule Search exposes `deny_rules` and `override_deny rules` in the UI when you search for them in the Rule Search page.

For the changes in the UI, see Security Policy Guide, Policy Check and Rule Search.

Table 6. New Property

Property Name	Type	Description	Required

`rule_types`	Array of enums:
	`sec_rules`
	`deny_rules`
	`override_deny_rules`
		Requested rule_types that should be searched for	No

Rules Reference

This topic covers properties, parameters, and examples of rules.

Parameters

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) or `active` (provisioned)	String	Yes
`rule_set_id`	Ruleset ID	Integer	Yes
`external_data_reference`	A unique identifier within the external data source. For example, if this rule information is stored in an external database.	String	No
`external_data_set`	The data source from which the resource originates. For example, if this rule information is stored in an external database.	String	No
`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

Get an Individual Security Rule from a Ruleset

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

Properties to create rules

Property	Description	Type	Required
`enabled`	Indicates if the rule is enabled or disabled.	Boolean	Yes
`providers`	Entities that can be used as a Source in a rule. Reference to `sec_policy_rule_sets_sec_rules_providers_put.schema.json`		Yes
`consum`	Entities that can be used as a Destination in a rule. Reference to `sec_policy_rule_sets_sec_rules_destinations_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 datacenter "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, then machine authentication is used for the rule, meaning that any hosts defined in the rule have been configured for the PKI-based machine authentication.	Boolean	No

Property	Description	Type	Required
	Before using this property, your PCE must already be configured for machine authentication. See the PCE Administration Guide for information on configuring machine authentication for the PCE.		
`consuming_security_principals`	Reference to `common/consuming_security_principals_put.schema.json`		
`unscoped_destinations`	Set the scope for rule destinations to All	Boolean	
`network_type`	Reference to `common/rule_network_type.schema.json`		
`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 creating rules.

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
```

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"}}],"destinations":
[{"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
```

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_1c2618a67847c94b8:98c76f7a4563f29cd78b3392684cd5ec09534bafe
5197fe8e901d95561bdd8f5| 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"
        }
        }
    ],
    "destinations": [ {
    "actors": "ams"
        }
        ],
    "consuming_security_principals": [],
    "sec_connect": false,
    "stateless": false,
    "machine_auth": false,
    "unscoped_destinations": false,
```

```
    "network_type": "brn",
    "use_workload_subnets": [], "ingress_services": [
        {
        "href": "/orgs/1/sec_policy/active/services/1" }
        ],
    "egress_services": [],
    "resolve_labels_as": {
    "providers": [
    "workloads"
        ],
    "destinations": [
    "workloads"
        ]
    }
}
],
```

Create a Rule

```
curl -u
api_1c2618a67847c94b8:98c76f7a4563f29cd78b3392684cd5ec09534bafe
5197fe8e901d95561bdd8f5 -X POST -H 'Content-Type: application/
json' -d '{"providers":[{"label": {"href":"/orgs/1/labels/
14"}}],"destinations":[{"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_secur
ity_principals":
[],"sec_connect":true,"machine_auth":false,"stateless":false,"u
nscoped_
destinations":false,"description":"","use_workload_subnets":
[],"resolve_labels_as": {"destinations":
["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
            }
            ],
    "destinations": [
        {
        "label": {
            "href": "/orgs/1/labels/15"
        },
        "exclusion": false
        }
    ],
    "consuming_security_principals": [],
        "sec_connect": true,
        "stateless": false,
        "machine_auth": false,
        "unscoped_destinations": 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"
        ],
    "destinations": [
        "workloads"
        ]
    }
}
```

Update a Rule

```
curl -w "%{http_code}" -u
api_1c2618a67847c94b8:98c76f7a4563f29cd78b3392684cd5ec09534bafe
5197fe8e901d95561bdd8f5 -X PUT -H 'Content-Type: application/
json' -d '{"providers":[{"exclusion":false,"label":{"href":"/
orgs/1/labels/14"}}],"destinations":
[{"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_secur
ity_principals":
[],"sec_connect":true,"machine_auth":false,"stateless":false,"u
nscoped_
destinations":false,"description":"","use_workload_subnets":
[],"resolve_labels_as":{"providers":
["workloads"],"destinations":["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 updated:

```
204
```

Rulesets

This Public Stable API lets you get, create, update, and delete 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 instance.	`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 Illumio Segmentation for Data Centers policy model and consist of the following elements:

- **Scopes**

  Scopes, encompassing sets of labels like application, environment, and location, delineate the boundaries of rules within a ruleset. Workloads sharing common labels within a ruleset scope are bound by the rules specified in the ruleset. A scope can comprise zero or more application, environment, and location labels and may include label groups.

An empty array scope ([]) signifies inclusion of all applications, environments, and locations. If a label type is omitted, all instances of that type are permitted unless other labels are present. However, using a label type in a rule necessitates that the scope for that label type is set to "All." Rulesets can efficiently incorporate multiple scopes to address a given policy's specific security requirements.

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

> **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 comprises multiple providers offering services over specific ports and protocols, destinations utilizing the services provided by the source, and various specified services. Sources and destinations within these rules can represent individual workloads, role labels denoting multiple workloads, IP lists, among other possibilities.

Example Ruleset Scope

Each label in a scope is identified by its HREF. 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.

Get Rulesets

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

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

NOTE

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

URI to Get a Collection of Rulesets

`pversion`: Contains provisionable objects 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]
```

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 REST API. More than 500 rules are not fully displayed in the PCE web console.

URI to Create a Ruleset

```
POST [api_version][ruleset_href]
```

Update a Ruleset

To update an individual ruleset, you need its HREF, which you can obtain when you retrieve 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`.

Delete a Ruleset

To delete an individual ruleset, you need its HREF, which you can obtain when you get a collection of rulesets.

URI to Delete an Individual Ruleset

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

Rule-Based Label Mapping

New APIs for managing the new feature, Rule-based label mapping, are the following:

Label Mapping API Methods

Functionality	HTTP	URI
Returns the collection of label mapping rules.	GET	/orgs/:xorg_id/label_mapping_rules
Creates a new label-mapping rule.	POST	/orgs/:xorg_id/label_mapping_rules
Deletes multiple label mapping rules	PUT	/orgs/{org_id}/label_mapping_rules/delete
Gets the instance of a single label-mapping rule.	GET	/orgs/:xorg_id/label_mapping_rules/:label_mapping_rule_id
Updates the instance of a single rule.	PUT	/orgs/:xorg_id/label_mapping_rules/:label_mapping_rule_id
Deletes the specified label-mapping rule.	DELETE	/orgs/:xorg_id/label_mapping_rules/:label_mapping_rule_id
Reorders label-mapping rules.	PUT	/orgs/{org_id}/label_mapping_rules/{label_mapping_rule_id}/reorder
This asynchronous API runs a set of label-mapping rules on a set of workloads.	POST	/orgs/:xorg_id/label_mapping_rules/run
Gets the status of the async job to run the rules.	GET	/orgs/:xorg_id/label_mapping_rules/run/:job_uuid
Downloads the results of the run rules job.	GET	/orgs/:xorg_id/label_mapping_rules/run/:job_uuid/download
Assign labels from the results of the label-mapping rules, and run the job.	PUT	/:xorg_id/label_mapping_rules/run/:job_uuid/assign_labels
Bulk label update	PUT	[api_version][label_href]label_mapping_rules_update

Bulk label update

If an organization has 500 rules defined, the UI must make up to 500 individual calls in an enable/disable rules operation.

This issue is resolved using the "bulk update" endpoint, which was chosen instead of a "bulk enable/disable" API because it provides additional flexibility to support future use cases.

`label_mapping_rule_label_assignments.schema.json`

The property `label_assignment` was deleted and replaced with a reference to `label_mapping_rule_label_assignments.schema.json` for the following APIs:

- `label_mapping_rules_post`
- `label_mapping_rules_get`
- `label_mapping_rules_put`

Rule Hit Count

The Rule Hit Count feature is configured so that only certain VENs can compute the rule hit counts and send the rule ID to the PCE.

Enabling Rule Hit Count

The Rule Hit Count feature is disabled by default on all the VENs and the PCE.

To use the Rule Hit Count feature, you must first enable it on the PCE and the relevant VENs.

Enable Rule Hit Count on a VEN

Use the following API to enable the feature on a VEN on all scopes:

PUT api/v2/orgs/:xorg_id/sec_policy/draft/firewall_settings

```
{
       "rule_hit_count_enabled_scopes":[[]]
}
```

This sample API can be used to enable features in specific scopes. This example enables the features on all VENs with labels 7 and 12.

```
{
    "rule_hit_count_enabled_scopes": [
       [
        {
           "label": {
            "href": "/orgs/1/labels/7"
        }
        },
        {
           "label": {
            "href": "/orgs/1/labels/12"
           }
        }
       ]
     ]
}
```

Commit or provision these DRAFT changes.

POST /api/v2/orgs/:xorg_id/sec_policy

```
{
    "update_description":"Enable rule hit count",
    "change_subset": {
        "firewall_settings":
        [
            {
            "href":"/orgs/1/sec_policy/draft/firewall_settings"
            }
        ]
    }
}
```

Disable the feature Rule Hit Count on all VENs:

PUT api/v2/orgs/:xorg_id/sec_policy/draft/firewall_settings

The property `rule_hit_count_enabled_scopes` was added to this API:

```
{
        "rule_hit_count_enabled_scopes": []
}
```

Enable Rule Hit Count on a PCE

Use the following API to enable the feature on a PCE:

PUT /api/v2/orgs/:xorg_id/report_templates/rule_hit_count_report

```
{
    "enabled": true
}
```

Generating Rule Hit Count Reports

A Rule Hit Count report can be either a scheduled report generated on a recurrent basis or an ad-hoc report.

To generate the Rule Hit Count report, two new schemas have been introduced: `rule_hit_count_ report_params` and `rule_set_lists`.

Rule Hit Count Reports

A Rule Hit Count report can be either a scheduled report generated on a recurrent basis or an ad-hoc report. To generate the Rule Hit Count report, two new schemas have been introduced: `rule_hit_count_ report_params` and `rule_set_lists`:

rule_hit_count_report_params

The new schema returns the rule hit count statistics for all the rules in a ruleset during the specified time range.

```
{
    "$schema": "http://json-schema.org/draft-04/schema#",
    "description": "Returns the rule hit count stats for all
the rules in a
                        ruleset during the specified time-
range",
    "type": "object",
    "additionalProperties": false,
    "required": [
        "report_time_range",
        "rule_sets"
    ],
    "properties": {
        "report_time_range": {
        "description": "Time range the report is built across",
        "type": "object",
        "oneOf": [
            {
            "$ref":
"report_time_range_definitions.schema.json#/
                definitions/custom_date_range"
            },
            {
            "$ref":
"report_time_range_definitions.schema.json#/
                definitions/last_num_days"
        }
        ]
        },
        "rule_sets": {
            "$ref": "rule_set_lists.schema.json"
            },
        "max_results": {
            "description": "maximum number of rules to return
in
                the specified time-range
                                in descending order of rule
creation time",
            "minimum": 0,
            "maximum": 200000,
            "type": "integer"
        }
    }
}
```

rule_set_lists

This schema returns the rule hit count statistics for all the rules in a ruleset during the specified time range.

```
{
    "$schema": "http://json-schema.org/draft-04/schema#",
    "description": "Returns the rule hit count stats for all
the rules in a
                        ruleset during the specified time-
range",
    "type": "array",
    "items": {
        "type": "object",
        "additionalProperties": false,
        "required": [
            "href"
        ],
        "properties": {
            "href": {
                "description": "HREF of the ruleset",
                "type": "string"
            }
        }
    }
}
```

Generate an Ad-hoc Report

The following API can create a report for the last x number of days. The example generates a rule hit count report for all rule sets for the last 30 days.

```
POST /api/v2/orgs/:xorg_id/reports
```

```
{
    "report_template": {
        "href": "/orgs/1/report_templates/
rule_hit_count_report"
    },
    "description": "My first rule hit count report",
    "report_parameters": {
        "report_time_range": {
            "last_num_days": 30
        },
        "rule_sets": []
    },
    "send_by_email": true
}
```

The example response:

```
{
    "href": "/orgs/1/reports/d1b80240-ffa5-4e99-b2a0-
c3d4946efe03",
    "report_template": {
        "href": "/orgs/1/report_templates/
rule_hit_count_report",
        "name": "Rule Hit Count Report"
    },
    "description": "My first rule hit count report",
    "created_at": "2023-11-03T07:52:04.018Z",
    "updated_at": "2023-11-03T07:52:04.018Z",
    "progress_percentage": 0,
    "generated_at": null,
    "status": "pending",
    "report_parameters": {
            "report_time_range": {
                "last_num_days": 30
            },
            "rule_sets": []
        },
    "send_by_email": true,
    "created_by": {
        "href": "/users/1"
    },
    "updated_by": {
        "href": "/users/1"
    }
}
```

To create a report for a custom date range, use the following:

```
{
    "report_template": {
        "href": "/orgs/1/report_templates/
rule_hit_count_report"
    },
    "description": "My first rule hit count report",
    "report_parameters": {
        "report_time_range": {
            "start_date": "2023-10-03T00:00:00Z",
            "end_date": "2023-11-03T23:59:59Z"
        },
        "rule_sets": []
    },
    "send_by_email": true
}
```

Check the Status of the Report

Use a GET API and the HREF from the POST response to check the status of the report:

```
GET /api/v2/orgs/:xorg_id/reports/:report_uuid
```

```
{
    "href": "/orgs/1/reports/d1b80240-ffa5-4e99-b2a0-
c3d4946efe03",
    "report_template": {
        "href": "/orgs/1/report_templates/
rule_hit_count_report",
        "name": "Rule Hit Count Report"
    },
    "description": "My first rule hit count report",
    "created_at": "2023-11-03T07:52:04.018Z",
    "updated_at": "2023-11-03T07:52:05.233Z",
    "progress_percentage": 100,
    "generated_at": "2023-11-03T07:52:05.233Z",
    "status": "done",
    "report_parameters": {
        "rule_sets": [],
        "report_time_range": {
           "last_num_days": 30
        }
    },
    "send_by_email": true,
    "created_by": {
        "href": "/users/1"
    },
    "updated_by": {
        "href": "/users/1"
    }
}
```


Map the Ruleset HREF to the Ruleset

When you map the ruleset HREf to the ruleset, the response contains the HREF of the user:

```
{
    "href": "/orgs/2293773/sec_policy/active/rule_sets/
9851624184900724",
    "created_at": "2024-07-24T18:24:31.400Z",
    "updated_at": "2024-07-31T21:46:43.166Z",
    "deleted_at": null,
    "created_by": {
        "href": "/users/9851624184872975"
    },
    "updated_by": {
        "href": "/users/9851624184872975"
    },
    "deleted_by": null,
    "name": "App19492 | Env19492",
    "description": null,
    "external_data_set": "illumio_policy_generator",
    "external_data_reference": "9851624185012145 |
9851624185012146",
    "enabled": true,
    "scopes": [
       [{
        "label": {
           "href": "/orgs/2293773/labels/9851624185012145"
        },
        "exclusion": false
       }, {
        "label": {
           "href": "/orgs/2293773/labels/9851624185012146"
        },
        "exclusion": false
      }]
   ],
   "rules": [{
    "href": "/orgs/2293773/sec_policy/active/rule_sets/
9851624184900724/sec_rules/9851624184910709",
        "created_at": "2024-07-24T18:24:31.548Z",
        "updated_at": "2024-07-24T18:24:31.589Z",
        "deleted_at": null,
        "created_by": {
           "href": "/users/9851624184872975"
        },
        "updated_by": {
          "href": "/users/9851624184872975"
        },
        "deleted_by": null,
        "description": "",
```

```
        "enabled": true,
        "providers": [{
        "label": {
           "href": "/orgs/2293773/labels/9851624185012147"
        },
        "exclusion": false
       }, {
        "label": {
           "href": "/orgs/2293773/labels/9851624185012144"
        },
        "exclusion": false
       }],
        "destinations": [{
        "label": {
           "href": "/orgs/2293773/labels/9851624185012147"
        },
        "exclusion": false
       }, {
        "label": {
           "href": "/orgs/2293773/labels/9851624185012144"
        },
        "exclusion": false
       }],
        "consuming_security_principals": [],
        "sec_connect": false,
        "stateless": false,
        "machine_auth": false,
        "unscoped_destinations": false,
        "network_type": "brn",
        "use_workload_subnets": [],
        "ingress_services": [{
            "port": 8080,
            "proto": 17
        }],
        "egress_services": [],
        "resolve_labels_as": {
        "providers": ["workloads"],
        "destinations": ["workloads"]
    }
   }],
    "ip_tables_rules": [],
    "deny_rules": [],
    "caps": ["write", "provision"]
}
```

Download the Report

When the report's status is completed, it is emailed to the user who created the report if the option `send_by_email` is set. Once the status of the report is set to "done," the report can be downloaded using the download API as follows:

```
GET /api/v2/orgs/:xorg_id/reports/:report_uuid/download
```

The sample response that can be saved as CSV:

```
Rule HREF,Rule Name,Rule Set HREF,Rule Set Name,Rule Hit
Count,Days Since Last Hit,
        Last Updated Timestamp,Last Updated By,Start Date,End
Date
/orgs/1/sec_policy/active/rule_sets/1/sec_rules/23,"",/orgs/1/
        sec_policy/active/rule_sets/
1,Default,0,-1,2023-08-07T22:55:37-07:00,
              /users/
1,2023-10-04T00:00:00Z,2023-11-02T23:59:00Z
/orgs/1/sec_policy/active/rule_sets/1/sec_rules/21,"",/orgs/1/
sec_policy/active/
        rule_sets/1,Default,0,-1,2023-07-25T04:48:09-07:00,
              /users/
1,2023-10-04T00:00:00Z,2023-11-02T23:59:00Z
/orgs/1/sec_policy/active/rule_sets/1/sec_rules/19,"",/orgs/1/
sec_policy/active/
        rule_sets/1,Default,0,1,2023-07-25T04:35:31-07:00,
              /users/
1,2023-10-04T00:00:00Z,2023-11-02T23:59:00Z
/orgs/1/sec_policy/active/rule_sets/1/sec_rules/8,"",/orgs/1/
sec_policy/active/
        rule_sets/1,Default,0,-1,2023-07-21T16:34:08-07:00,
              /users/
1,2023-10-04T00:00:00Z,2023-11-02T23:59:00Z
/orgs/1/sec_policy/active/rule_sets/1/sec_rules/3,"",/orgs/1/
sec_policy/active/
        rule_sets/1,Default,0,1,2023-07-20T04:22:23-07:00,
             /users/1,2023-10-04T00:00:00Z,2023-11-02T23:59:00Z
/orgs/1/sec_policy/active/rule_sets/1/sec_rules/1,Allow
outbound connections,/
        orgs/1/sec_policy/active/rule_sets/
1,Default,0,1,2023-07-25T04:52:39-07:00,
             /users/1,2023-10-04T00:00:00Z,2023-11-02T23:59:00Z
/orgs/1/sec_policy/active/enforcement_boundaries/5,my test
deny rule with iplists,
        "","",0,-1,2023-07-20T03:00:05-07:00,
             /users/1,2023-10-04T00:00:00Z,2023-11-02T23:59:00Z
/orgs/1/sec_policy/active/enforcement_boundaries/
3,ransomware_deny_rule2,"",
        "",0,1,2023-06-30T17:16:38-07:00,
             /users/1,2023-10-04T00:00:00Z,2023-11-02T23:59:00Z
/orgs/1/sec_policy/active/enforcement_boundaries/1,ransomware
deny rule,"",
        "",0,-1,2023-06-07T23:32:07-07:00,
             /users/1,2023-10-04T00:00:00Z,2023-11-02T23:59:00Z
```

Schedule a Recurrent Report

You need to create a report schedule to create a recurring report. In this example, the "Monthly Rule Hit Count Report" has been generated for the last 30 days and will be emailed to the person who requested it.

To create a report schedule:

```
{
    "report_template": {
        "href": "/orgs/1/report_templates/
rule_hit_count_report"
    },
    "report_parameters": {
        "report_time_range": {
            "last_num_days": 30
        },
        "rule_sets": []
    },
    "send_by_email": true,
    "report_generation_frequency": "monthly",
    "name": "Monthly Rule Hit Count Report",
}
```

Other API Changes to Support the Rule Hit Count Feature:

`sec_policy_label_groups_get`

The property `rule_hit_count_enabled_scopes` was added.

```
"properties": {
    "rule_hit_count_enabled_scopes": {
        "description": "Label Group is referenced by Rule Hit
            Count Enabled Scopes",
        "type": "boolean"
        }
```

`sec_policy_firewall_settings_get`

The property `rule_hit_count_enabled_scopes` was added.

```
{
    "properties": {
        "rule_hit_count_enabled_scopes": {
            "description": "Workloads that match the scope
            will have rule hit count enabled",
            "$ref": "../common/rule_set_scopes_get.schema.json"
        }
    }
}
```

For the following APIs, a reference to the schema rule_hit_count_report_params was added.

`report_schedules_get`

`report_schedules_put`

`report_schedules_post`

`reports_post`

`report_templates_get`

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 the rules you create using Illumio Segmentation for Data Centers .

If you previously configured iptables on Linux workloads, 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 Illumio Segmentation for Data Centers the relationship between your iptables rules and 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 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). The rule cannot be saved or provisioned if an unsupported token is included.

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
```

Enforcement Boundaries

NOTE

Enforcement Boundaries are still available. However, they have been replaced by Deny Rules [149].

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 a 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`

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 later, 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 specific sets of workloads identified by scopes. Workloads that share the same labels configured for static policy update scope *receive* policy changes from the PCE. Still, 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 environments, applications, or locations 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 for policy update

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`

Get Policy Update Mode

`This method can be used to get your organization's current policy update mode settings, which are part of your PCE security settings. It contains a variable (:pversion) that can be used to return the security settings with an 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
```

Change Policy Update Mode

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

You can modify the draft state of your policy update mode, 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
```

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.

Security Policy Objects

Security policy objects contain information about policy versions and 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 of the security policy.

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 label.	`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 of labels returned in a GET collection is 500.

NOTE

GET returns any label containing a match, rather than an exact one. For example, a GET request for labels with value=APP could return APP, WEB-APP, and WEBAPP.

URI to Get Collection of Labels

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

URI to Get an Individual Label

```
GET [api_version][label_href]
```

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 string value:

- **Application** (“app”): The type of application the workload supports. Examples are HRM, SAP, Finance, and Storefront.
- **Role** (“role”): The function of a workload. A simple two-tier application consisting of a web server and a database server has two roles: Web and Database.
- **Environment** (“env”): The stage in the development of the application. For example, production, QA, development, and staging.
- **Location** (“loc”): The location of the workload. For example, Germany, the US, Europe, and 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 defined as "All" that create broad policies to cover all applications, environments, and 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) 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 avoiding the creation of labels with names similar to these default system labels to prevent confusion.

URI to Create a Label

```
POST [api_version][org_href]/labels
```

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]
```

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]
```

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 grou.p	`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 Asynchronous GET Collections.

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]
```

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 belongs 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]
```

Delete a Label Group

To delete an individual label group, specify the HREF of the label group you want to delete. The HREF 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]
```

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.

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.

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]
```

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
```

Update a Service

To update (PUT) an individual service, you need to know its HREF. The HREF of a service is returned when you get a collection of services from the PCE.

URI to Update an Individual Service

```
PUT [api_version][service_href]
```

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]
```

Core Services Detection

This Public Experimental API helps you identify core services and suggests an appropriate label. 51 services can be detected.

Core services (such as DNS, Domain Controller, NTP, and LDP) are essential to your computing environment and run on one or 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 the port numbers on which a specific core service is running to adjust them to their environment. However, users cannot change ports using the UI, only the APIs.

The user authorized to manage core services is the Organization Administrator.

The Common schemas for managing core services:

- `core_services_labels.schema.json`
- `core_services_type_ports_def.schema.json`
- `core_services_type_ports.schema.json`

Core 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 the 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 the 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 the suggested labels of a core service type for the organization.	`PUT`	`[api_version][org_href]/core_service_types/:uuid`

Filter for Managed Services

Filtering Workloads and Virtual Services

This API allows you to filter all managed services, such as workloads and virtual services.

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

Virtual Services

This Public Stable API allows you to write rules per service 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.

You can use it in rules once you have created, provisioned, and bound a virtual service to a specific workload. See Create an Individual Virtual Service [193].

About 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 representing 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, identified by 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.

- A**pplying Rules to one of the many Virtual Services Running on a Workload**

  In this case, multiple virtual services run on the workload, each with a different label, and the rule targets a subset of these 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 for the updated workloads to allow virtual services.

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 take effect on 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)

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
```

Get an Individual Virtual Service

In the call, you identify the virtual service by its HREF, which you can obtain when you get a collection of virtual services.

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
```

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 (`[ ]`).

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 those resources, such as a configuration management database (CMDB) that serves as the "source of truth" for your PCE resources.

After creating virtual services and adding identifiers to the service properties, you can collect 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 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 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 com-

mand 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`.

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
```

Virtual Service Bindings

After you create and provision a virtual service, 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 a service binding, delete it 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]

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, allowing you to create multiple service bindings with a single POST request.

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
```

Delete an Individual Service Binding

To delete both the service bindings and virtual services, delete the service bindings first, then delete the virtual services.

Get an Individual or a 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]
```

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 Illumio Segmentation for Data Centers .Each virtual server has only one VIP. The local IP addresses are used as source IP addresses for connection to the pool members (backend servers) when the virtual server operates in SNAT 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.

Virtual Server Methods

There are two groups of methods used to manage virtual servers:

- Methods for virtual servers
- Methods for discovering virtual servers

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`
Create a Virtual Server object.	`POST`	`[api_version][org_href]/sec_policy/:version/virtual_servers`
Modify the enforcement mode, labels, and backend/source labels of a specified Virtual Server.	`PUT`	`[api_version][org_href]/sec_policy/:version/virtual_servers/:uuid`

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 Server.	GET	[api_version][org_href]/discovered_virtual_servers/:uuid
Discovery	GET	[api_version][org_href]/network_enforcement_nodes/ virtual_server_discovery_jobs/:uuid

Virtual Server Filtering

Filtering of the discovered virtual servers and draft 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.

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, the virtual server ip_address, and the 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

Check the Status of the 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
```

Discovered Virtual Servers

Filter	URI Example	Notes
`name`	`/discovered_virtual_servers?name`	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 in-complete 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 "en-forced"
labels	/virtual_servers?[[/orgs/1/la-bels/2, /orgs/1/labels/3], [/orgs/1/labels/4]] (JSON encoded array of arrays)	
discov-ered_virtu-al_server	/virtual_servers?discovered_virtu-al_server =/orgs/1/discovered_vir-tual _servers/<uuid>	

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 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]`
Get a list of IP List attributes.	`GET`	`[api_version][org_href]/ip_list_attributes`
Create an IP list	`POST`	`[api_version][org_href]/sec_policy/draft/ip_lists`
Create a list of IP attributes.	`POST`	`[api_version][org_href]/ip_list_attributes`
Update an IP list	`PUT`	`[api_version][ip_list_href]`
Upsert IP lists in bulk via CSVs.	`PUT`	`[api_version][org_href]/sec_policy/ip_lists_bulk_upload`
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 Asynchronous GET Collections.

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]
```

Create an IP List

This API allows you to create IP lists (allowlists) that can be used to create rules in rulesets. An IP list can contain a single IP address or an IP address range.

WARNING

Please be aware of the following:

0.0.0.0/0 means 0-255 . 0-255 . 0-255 . 0-255 or all possible IP addresses.

0.0.0.0 without the trailing "/0", means a single IP (not ANY IP). This is a rare but sometimes needed object, specifically for DHCP Discovery.

0.0.0.0, when used improperly, might trigger an error, prevent the list from being accepted, and consequently block traffic.

Use the correct syntax for the intended purpose.

URI to Create an IP List

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

Bulk Upload of IP Lists

This API allows customers to upsert IP lists in bulk via CSVs.

```
{
  "$schema": "http://json-schema.org/draft-04/schema#",
  "description": "IpList bulk_update",
  "type": "array",
  "maxItems": 1000
}
```

Non-Corporate Public IP Addresses

The API `sec_policy/rule_coverage` supports non-domain interfaces.

Table 7. Security Policy Rule Coverage

Security Principals Methods	HTTP	URI
Get Security Principals	`POST`	`[api_version][org_href]/sec_policy/rule_coverage`

Security Principals

Security principals are typically unique identifiers for Windows Active 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`

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`.

Update a Security Principal

Use a PUT command to update a security principal.

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.

About RBAC

Role-based Access Control (RBAC) is a Public Experimental API that gets, 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 source (IdP).

Before using the RBAC feature with the REST API, learn about Illumio Segmentation for Data Centers permission model and its terms and concepts.

RBAC Terms and Concepts

Before using the RBAC API, you should know the following RBAC terms.

Role-Based Access Control (RBAC)

RBAC has two main concepts: users and permissions.

User

A user is a PCE account that provides login or API access to the PCE. The PCE can manage a user locally 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 are associated with 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.

- 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.
- A scope contains zero or more applications, environments, and location labels. Each label in the scope is identified by its HREF. A scope can also contain zero or more label groups.
- 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 connects a user account with its permissions (a role, and, depending on the role, scopes).

NOTE

If you use an external identity provider to manage user access to the PCE, ensure that your identity provider is configured and that 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 email invitation to the user's email address. (If you use an external identity source 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 scopes to the authorization security principal**
   Once a user account has been associated with an authorization security principal, you can assign it an RBAC role and add custom scopes if the user role requires them.

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 Illumio Segmentation for Data Centers specify the domain boundaries granted to a user.
- Manage user authentication and authorization.

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 source (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 organizations 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 requesting the agent service.	`PUT`	`[user_href]local_profile/password`

Get RBAC Users

These methods get a collection of users or individual users in the organization.

By default, the maximum number of users returned from a GET collection is 500. To get more than 500 users, use Asynchronous GET Collections.

URI to Get a Collection of Local Users

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

URI to Get an Individual User

```
GET [user_href]
```

Create a Local User

This method creates local users whom the PCE manages.

URI to Create a Local User

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

User Profiles

Change a user's status by converting a local user to an external user or vice versa.

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`

Convert External User to Local User

This method converts externally managed users to local users managed by the PCE.

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.

RBAC User Operations Reference

This topic covers parameters, properties, and examples for RBAC user operations.

Parameters

Parameter	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

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_pass-word`	The current password that you want to change	String	Yes
`new_password`	New password to set	String	Yes

Examples

Convert Local to External User

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

URI to Convert an External User to a Local User

```
POST [user_href]/local_profile
```

Example

```
POST https://pce.my-company.com:8443/api/v2/users/14/
local_profile
```

Re-invite a Local User

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 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"
}
```

Request body to create a local user

```
{
  "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"}'
```

Curl Command to 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
```

Curl Command to Reinvite 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
```

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 users' write permissions, while read permissions were unrestricted, and every user had visibility into PCE. The App Owner RBAC role also restricts read permissions to correspond to the user roles. This accelerates enterprise-wide expansion, allowing customers who acquired Illumio for a single application to expand more quickly.

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.
- Ensures compliance with good security practices so that users cannot view the sensitive information they are not allowed to see.
- It eliminates the complexity of building a custom portal. 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, and PCE owners can assign scoped roles for these.

App Owner Roles

Users and user groups are assigned the roles of Ruleset Managers, Ruleset Provisioners, and Workload Managers. These roles can be expanded to give users additional read/write permissions. All permissions are additive.

Ruleset Manager with Scoped Reads

This RBAC role has write permission, allowing its owner to modify the policy. Users with this role can view only the content related to their location in the PCE rather than having full read-only access to the entire PCE content as before.

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 view only the content related to their location in the PCE, rather than having full read-only access to the entire PCE content.

The role now also supports scoped reads.

Ruleset Viewer

This RBAC role has access to the PCE to manage one or more applications. Users with this role can view their application and its dependencies, but they cannot view information about other applications.

Workload Manager with Scoped Reads

This RBAC role provides control for managing workloads. Users with this role can view only the content related to their scope in the PCE, rather than having full read-only access to the entire PCE content.

The role now also supports scoped reads.

About 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

Label groups have been added to the response and parameters in addition to labels 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 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"}}]
```

Ruleset Manager and Ruleset Provisioner

Suppose you grant 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.

A default read-only user permission is organization-wide and inherited by all users. This global permission allows users with no permissions explicitly granted to access the PCE.

NOTE

For more information, see Organization-Wide Default User Permission [220].

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
```

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 [217].

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 [217] does not apply.

Managing 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

Label groups have been added to the response and parameters in addition to labels because they are now supported in user scopes.

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.

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]
```

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 that restrict the permission to operate on specified labeled resources can be applied.

URI to Create a New Permission:

```
POST [api_version][org_href]/permissions
```

Update an RBAC Permission

This method updates permissions, such as changing the permission role, authorization security principal, user, or group.

URI to update permission:

```
PUT [api_version][permissions_href]
```

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
```

User Permissions

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 source for user management, you might want to block some of those users from the PCE without removing them from your identity source. *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 source 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, 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 it later.
3. Delete the permission associated with the `null` authorization security principal.

Get a Collection of Authorization Security Principals

The first step in disabling organization-wide read-only permission is to collect all authorization security principals in your organization.

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 exactly as the object returned to you when you got the permission. The request body below illustrates the JSON structure of this permission object.

RBAC Permissions Reference

This topic covers parameters, properties, and examples for RBAC permissions.

Parameters

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, 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
`rule-set_manager`	Full Ruleset Manager	Add, edit, and delete all rulesets within a specified scope. Add, edit, and delete rules when the Source matches a specified scope. The rule Destination 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 Source and Destination match the specified scope. Ruleset managers with limited privileges cannot manage rules that use IP lists, user groups, label groups, iptables rules as destinations, 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.
`scope`		The `org_scope.schema.json` is now used instead of `labels_summary.schema.json` and `labels.schema.json`.

Parameters for RBAC Permissions

Parameter	Description	Type	Required
`org_id`	Organization	Integer	Yes
`auth_security_principal`	The authorization security principal is associated with the permission. Individual permissions do not need to be obtained or deleted. The HREF of the authorization security principal (`auth_security_principal`) associated with the user or group being granted the 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 is 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 ObjectProvisioner 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 PCE Administration Guide, Role-Based Access for Application Owners.
	
	Unscoped roles:
	
	• `owner`
	• `admin`
	• `read_only`
	• `global_object_provisioner`
	
	Scoped roles:
	
	• `ruleset_manager`
	• `limited_ruleset_manager`
		String	Yes

Parameter	Description	Type	Required
	• `ruleset_provisioner`		
`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

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 is associated with the permission. It is not needed to get individual permission or to delete a permission. Reference to `auth_security_principal_uri.schema.json`		
`role`	The RBAC role is 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

Examples

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
```

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 and 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"
                    }
    },
        ........
}
```

```
{
  "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"}
}
```

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]`

Get Authorization Security Principals

This method gets an individual or a collection of authorization security principals in your organization.

By default, the maximum number of authorization security principals returned from a GET collection is 500.

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}
```

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
```

Update an Authorization Security Principal

To update an individual authorization security principal, use its HREF, which is obtained from the response to a GET collection.

URI to Update an Individual Authorization Security Principal

```
PUT [api_version][auth_security_principal_href]
```

Delete an Authorization Security Principal

To delete an authorization security principal, use its HREF, which is returned in the response to a GET collection request.

URI to Delete an Individual Authorization Security Principal

```
DELETE [api_version][auth_security_pincipal_href]
```

Authorization Security Principals Reference

This topic covers properties, parameters, and examples of authorization security 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 the e-mail address of the local user. • If an external IDP manages the user or group, 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

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 the e-mail address of the local user. • If the user or group is 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

Examples

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
```

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"}'
```

Request body to ppdate an individual authorization security principal

```
{
   "type": "user",
   "name": "joe_user2@illumio.com",
   "display_name": "Joe User"
}
```

Curl Command Create an Authorization Security Principal

```
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"}'
```

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
```

About Visualization API

The Visualization API allows you to analyze traffic flows and gain insights into vulnerability exposure beyond reviewing workloads and traffic using the PCE web console.

The Explorer API is used to search and analyze PCE traffic flows.

Moreover, the VEN enriches flow summary logs with DNS names and forwards this information to the PCE. Additionally, the Explorer API appends DNS names, enabling auditors and analysts to view them without conducting reverse look-ups on random IP addresses.

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 restrict the search to specific port numbers and protocols.

Asynchronous Queries API Methods

The maximum number of results returned by the deprecated POST [api_version][org_href]/traffic_flows/traffic_analysis_queries method was 100,000, a reasonable limit for a user to view in the UI.

When Explorer captures 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 must support both single-node and multi-node Explorer in the SuperCluster environment.

The 100,000-result limit was increased to 200,000 to better support SuperCluster environments in Explorer.

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

Explorer Reference

This topic contains properties and examples for working with Explorer.

POST [api_version][org_href] traffic_flows/async_queries

Property	Description	Type
`query_name`	Name of the query	String
`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 `destinations`. Sources are treated as destinations 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 Destination 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 Source 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
`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. • `exclude`: Targets that can be *excluded* are workloads, labels, or IP addresses identified by their HREF and structured as JSON.	Object

Property	Description	Type
	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 service	
`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. This type of traffic occurs when a workload VEN is in the test policy state. • `blocked`: Blocked traffic. • `unknown`	Array of strings
`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
`exclude_workloads_from_ip_list_query`	Exclude workload traffic when IP List is provided either in the Destination or Source part of the traffic query.	Boolean
`data_sources`	This property was added in release 24.1 and describes the data sources of the flows to be **included** or **excluded**.	

Property	Description	Type
	• **include:Include** "server", "endpoint", "flowlink", "scanner" • **exclude:** "server", "endpoint", "flowlink", "scanner"	

GET [api_version][org_href] traffic_flows/async_queries_download

Property	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

Example Async Explorer Queries

Curl command for POST traffic_flows_async_queries

```
curl -i -u
api_1195cf055cf8a834c:148afd87ecc980900eaf10d6c54e6c0f607b22e0d
bf768dd007e51e731096282 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","polic
y_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","polic
y_decisions":[],"max_results":1000,"query_name":"worklaod
test"},"created_at":"2021-04-09T20:50:30Z","updated_at":"2021-0
4-09T20:50:30Z"}
```

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:148afd87ecc980900eaf10d6c54e6c0f607b22e0d
bf768dd007e51e731096282 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","polic
y_decisions":[],"max_results":1000,"query_name":"worklaod
tesrrrrrt"},"created_at":"2021-04-09T20:50:19Z","updated_at":"2
021-04-09T20:50:27Z"},
{"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","polic
y_decisions":[],"max_results":1000,"query_name":"worklaod
test"},"created_at":"2021-04-09T20:50:30Z","updated_at":"2021-0
4-09T20:50:32Z"
```

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","polic
y_decisions":[],"max_results":1000,"query_name":"worklaod
tesrrrrrt"},"created_at":"2021-04-09T20:50:19Z","updated_at":"2
021-04-09T20:50:27Z"}
```

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"
    }
}
```


Parameters for Database Usage Metrics

The organization flow Database Usage Metrics has the following required parameters:

Parameters	Description	Type	Re-quired
`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 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, counted once for each unique day	Number
num_weekly_tables	The number of endpoint weekly tables, 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"
}
```

Database Metrics

The API Database Metrics provide organization-specific insight into the current traffic database. They allow you to monitor their size and the amount of data you can store. They also give information about the number of days of data available.

The API `database_metrics` was expanded to include additional optional endpoint metrics:

`server`, `backlog` and `endpoint`.

Database Metrics API Methods

Functionality	HTTP	URI
Returns the organization's database usage metrics. Provides customers with organization-specific insight into the current traffic database size (#days, #GB).	`GET`	`[api_version][org_href]traffic_flows/database_metrics`

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 and specify time ranges and report types.

Reporting APIs belong to several groups based on their use:

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

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 APIs enable the Global Organization Administrator (this_global_org_user) to manage report templates. In each report template, users can specify the type, time range, recurrence, and suitable parameters for the report.

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 enables or disables a specific report type; only the organization administrator can do this.	PUT	[api_version][org_href]/report_templates

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`

Report Settings

Report Settings define how many days a report will be stored or persisted.

The user authorized as the Global Organization Administrator (this_global_org_user) can manage, list, or update report settings.

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`

  Report parameters for the 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 across which the report is built.

- `common legacy_workload_modes.schema.json`

  This function provides a summary of the assigned labels, including the label URI and the key and value in the key-value pair.

- `report_time_range_definitions.schema.json`

  This provides the report parameters for the executive summary report, such as the Start date for the range, the End date for the range, and the Last x number of days the report is built across.

- `labels_summary.schema.json`

Provides a summary of the assigned labels 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.

Reporting APIs Reference

This topic contains properties and examples for reporting APIs

Reporting Parameters and Properties

Parameter	Description	Parameter Type	Format
`org_id`	Organization	path	Integer
`report_schedule_id`	UUID of the report schedule	String	date/time

Property	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. These parameters are added as references: • `executive_summary_report_params. schema.json` • `traffic_flow_report_params. schema.json` • `explorer_report_params. schema.json` • `ves_report_params.schema.json` • `ransomware_risk_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

Properties for Report Templates

Property	Description	Parameter Type	Required
`href`	Report Template URI	String	Yes
`name`	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 one 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`
	`ransomware_risk_report_params. schema.json`
		Object	Yes

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 one 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`
	`ransomware_risk_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 Templates Examples

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:

- executive_summary_report_params.schema.json
- traffic_flow_report_params.schema.json

Report Schedules Examples

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`.

Multiple APIs are used to manage Ransomware Dashboard features and to generate reports about protection statistics:

Risk Summary APIs

Risk summary APIs are:

GET /api/v2/orgs/:xorg_id/app_groups/:app_group_id/risk_details

This API is added under specific `app_groups` to represent the `name` and `os_platforms` of the ransomware service.

This API is referencing the schema `workloads_by_exposure`:

workloads_by_exposure

The schema `workloads_by_exposure` describes the number of workloads with one or more critically risky services as its highest risk. It is also used by the API `risk_summary_get`.

GET /api/v2/orgs/1/app_groups/risk_summary

This API, added under app_groups, returns a ransomware risk summary for each app group.

This API is referencing the common schema `workload_exposure_severity`:

common workload_exposure_severity

The common schema `workload_exposure_severity` describes exposed ransomware severity for a workload.

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`

workloads_risk_details_get

This API, which supplies the risk details, can be seen in action on the Workloads page, tab Ransomware Protection.

In addition to the organization admin, users with access to the workload can view the ransomware protection details for that workload, such as how many risky ports are protected and how many risky ports are not protected.

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

Information about the operating systems has been added for the ransomware service: Windows and Linux.

settings_get

This Public Stable API now includes two new properties: `num_assets_requiring_ransomware_protection` and `cloud_secure_tenant_id`.

```
},
    "num_assets_requiring_ransomware_protection": {
      "description": "number of assets that need ransomware
protection for this org",
      "type": [
        "integer",
        "null"
      ]
    },
================

    },
    "cloud_secure_tenant_id": {
      "description": "Cloud Secure tenant id corresponding to
this organization",
      "type": "string"
    }
  }
}
```

settings_put

This Public Stable API was changed to include the 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.

```
"properties": {
    "num_assets_requiring_ransomware_protection": {
      "description": "number of assets that need ransomware
protection for this org",
      "type": "integer",
      "minimum": 1,
      "maximum": 9999999
    },
================
},
    "cloud_secure_tenant_id": {
      "description": "Cloud Secure tenant id corresponding to
this organization",
      "type": "string"
    }
  }
```

Risky Services APIs

The new widget for the Ransomware Dashboard displays risky services and their protection coverage scores.

GET /api/v2/orgs/:xorg_id/sec_policy/:pversion/services

The API now contains the property `average_protection_percent`, which is the average ransomware protection percentage for all service ports in the service.

To include the needed data in the response to this request from the UI, the query parameter `include_ransomware_protection_percent` is used and set to `true` to include the average percentage data.

Summary Reports

The APIs used to generate summary reports are:

- `reports_risk_summary_ransomware_timeseries_statistics_post`
- `reports_risk_summary_ransomware_timeseries_statistics_post_response`.
- `reports_risk_summary_get`
- `reports_time_series_statistics_post`
- `reports_time_series_statistics_post_response`

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`.

Payloads for this API can be as follows:

```
[{"property":"num_workloads_by_exposure","resolution":"day"}]
```

```
[{"property":"ransomware_protection_coverage_percent","resolution":"day"}]
```

reports_risk_summary_ransomware_timeseries_statistics_post_response

This API gives the start and end dates of the time.

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

The property `risky_ports_by_category` was added to support the widget "Risky ports by type" in the UI.

Four required properties are added for the ransomware objects:

- top_risky_applications
- top_risky_services
- num_risky_services
- num_unenforced_workloads

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.

Other APIs that support Summary Reports

- report_schedules_post
- report_schedules_put
- reports_schedules_get
- report_templates_get

- reports_get

APIs referencing `ransomware_risk_report_params` through the property `report_parameters`

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
- `num_workloads_by_exposure`: Number of workloads by exposure

Data is presented with the granularity of `day`, `week`, `month`, and `quarter`, where the default is `day`.

reports_time_series_statistics_post_response

This API specifies the time series data about the protected workloads.

This API gives the percentage of the end date of the counted period.

It is referencing the schema `num_workloads_by_exposure_time_series`.

Ransomware Dashboard Reference

This topic contains properties and examples for the Ransomware dashboard.

Ransomware API Details

GET /api/v2/orgs/:xorg_id/app_groups/:app_group_id/risk_details

```
  ====================================
    "workload_risk_summary_by_service": {
    "description": "Workload risk summary by ransomware
service",
    "type": "array",
    "items": {
        "type": "object",
        "required": [
        "href",
        "name",
        "os_platforms",
        "port",
        "protocol",
        "severity",
        "num_unprotected_workloads",
        "num_protected_workloads",

"average_ransomware_service_protection_coverage_percent"
       ======================================================
```

This API is referencing the schema `workloads_by_exposure`:

```


=====================================================

},
    "workloads_by_exposure": {
    "description": "Workloads of this app group by Ransomware
Exposure",
    "type": "object",
    "$ref": "workloads_by_exposure.schema.json"
},

=====================================================
```

workloads_by_exposure

```
{
    "$schema": "http://json-schema.org/draft-04/schema#",
    "type": "object",
    "properties": {
    "critical": {
        "description": "Number of workloads that have 1 or
more critically
                            risky services as its highest risk",
        "type": "integer"
    },
    "high": {
        "description": "Number of workloads that have 1 or
more high risk
                            services as its highest risk",
        "type": "integer"
    },
    "medium": {
        "description": "Number of workloads that have 1 or
more medium risk
                            services as its highest risk",
        "type": "integer"
    },
    "low": {
        "description": "Number of workloads that have 1 or
more low risk
                            services as its highest risk",
        "type": "integer"
    },
    "fully_protected": {
        "description": "Number of workloads that have no risky
services
                            and are fully protected",
        "type": "integer"
        }
    }
}
```

GET /api/v2/orgs/1/app_groups/risk_summary

```
    ================================
   },
    "risk_summary": {
    "description": "Risk Summary for this app group",
    "type": "object",
    "required": [
        "ransomware"
    ],
    ============================================
```

common workload_exposure_severity

```
{
    "$schema": "http://json-schema.org/draft-04/schema#",
    "description": "Exposed ransomware severity for workload",
    "type": "string",
    "enum": [
        "critical",
        "high",
        "medium",
        "low",
        "fully_protected"
    ]
}
```

workloads_get

```
{
 "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": {
            "$ref": "../common/
workload_exposure_severity.schema.json"
            },
           "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

```
{
   "$schema": "http://json-schema.org/draft-04/schema#",
   "type": "object",
   "properties": {
    "risk_details": {
    "type": "object",
    "required": [
       "ransomware"
    ],
    "ransomware": {
       "type": [
        "object",
        "null"
       ],
       "properties": {
          "details": {
        "type": "array",
        "items": {
           "$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_ransomeware_services

```
{
   "$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"
        ]
        }
      }
}
```

Additional information about 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

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

New property `num_assets_requiring_ransomware_protection` provides a number of assets that need ransomware protection in a specific organization (1 - 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
        ==================================
```

GET /api/v2/orgs/:xorg_id/sec_policy/:pversion/services

```
    ================================
{
    "properties": {
    "risk_details": {
        "properties": {
        "ransomware": {
            "properties": {
            "average_protection_percent": {
            "description": "This is the average of ransomware
                                        protection percentage
for all
                                        the service ports in
this service.",
            "type": "number"
            }
        }
        }
    }
    }
}
    ======================================================
```

Example response with the parameter `include_ransomware_protection_percent` set to `true`:

```
[
{
    "href": "/orgs/2/sec_policy/draft/services/4852",
    "created_at": "2020-01-13T23:31:21.710Z",
    "updated_at": "2020-01-13T23:31:21.750Z",
    "deleted_at": null,
    "created_by": {
        "href": "/users/142"
    },
    "updated_by": {
        "href": "/users/142"
    },
    "deleted_by": null,
    "update_type": null,
    "name": "IST Common POPv3",
    "description": "Post Office Protocol v3",
    "description_url": null,
    "process_name": null,
    "external_data_set": "illumio_segmentation_templates",
    "external_data_reference": "1000032 -- Universal - Version
1",
    "service_ports": [
        {
        "port": 110,
        "proto": 6
    }
    ],
    "risk_details": {
        "ransomware": {
            "category": "legacy",
            "severity": "low",
            "os_platforms": [
                "linux",
               "windows"
            ],
            "average_protection_percent": 0.2
        }
    }
}
```


reports_risk_summary_ransomware_timeseries_statistics_post

```
{
    "$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"
            ]
        },
        "resolution": {
        "type": "string",
        "description": "The granularity for the time series
data. E.g.
                                day, week, month, quarter",
        "enum": [
            "day",
            "week",
            "month",
            "quarter"
        ],
        "default": "day"
        },
        "max_results": {
        "type": "integer",
        "default": 5
        }
        }
    }
}
```

reports_risk_summary_ransomware_timeseries_statistics_post_response

A sample response of risk_summary:

```
{
    "ransomware": {
    "num_total_workloads": 2,
    "num_protected_workloads": 0,
    "workloads_by_exposure": {
        "critical": 2,
        "high": 0,
        "medium": 0,
       "low": 0,
        "fully_protected": 0
    },
    "risky_ports_by_severity": {
        "critical": {
        "num_protected_ports": 0,
        "num_unprotected_ports": 6
        },
       "high": {
        "num_protected_ports": 0,
        "num_unprotected_ports": 8
        },
       "medium": {
        "num_protected_ports": 0,
        "num_unprotected_ports": 20
        },
        "low": {
        "num_protected_ports": 0,
        "num_unprotected_ports": 14
        }
    },
    "risky_ports_by_category": {  ---- New section
        "admin": {
        "num_protected_ports": 0,
        "num_unprotected_ports": 26
        },
        "legacy": {
        "num_protected_ports": 0,
        "num_unprotected_ports": 22
        }
        },
    "ransomware_protection_coverage_percent": 0.0,
    "last_updated_at": "2023-11-27T22:08:09Z"
    }
}
```


A sample response of `ransomware_timeseries_statistics` with `ransomware_protection_coverage_percent`

```
[
    {
    "property": "ransomware_protection_coverage_percent",
    "time_series": [
        {
        "start_date": "2023-11-27",
        "end_date": "2023-11-27",
        "data": {
            "percentage": 59.67
        }
        },
        {
        "start_date": "2023-11-26",
        "end_date": "2023-11-26",
        "data": {
            "percentage": 56.0
        }
        },
        {
        "start_date": "2023-11-25",
        "end_date": "2023-11-25",
        "data": {
            "percentage": 23.8
        }
        },
        {
        "start_date": "2023-11-24",
        "end_date": "2023-11-24",
        "data": {
            "percentage": 23.0
        }
        },
        {
        "start_date": "2023-11-23",
        "end_date": "2023-11-23",
        "data": {
            "percentage": 5.0
        }
        }
        ]
    }
]
```


A sample response of `ransomware_timeseries_statistics` with `num_workloads_by_exposure`:

```
[
    {
    "property": "num_workloads_by_exposure",
    "time_series": [
        {
        "start_date": "2023-11-27",
        "end_date": "2023-11-27",
        "data": {
            "critical": 2,
            "high": 0,
            "medium": 0,
            "low": 0,
            "fully_protected": 0
        }
        },
        {
        "start_date": "2023-11-26",
        "end_date": "2023-11-26",
        "data": {
            "critical": 2,
            "high": 0,
            "medium": 0,
            "low": 0,
            "fully_protected": 0
        }
       },
       {
        "start_date": "2023-11-25",
        "end_date": "2023-11-25",
        "data": {
            "critical": 2,
            "high": 0,
            "medium": 0,
            "low": 0,
            "fully_protected": 0
        }
        },
        {
        "start_date": "2023-11-24",
        "end_date": "2023-11-24",
        "data": {
            "critical": 2,
            "high": 0,
            "medium": 0,
            "low": 0,
            "fully_protected": 0
```

```
        }
       },
       {
        "start_date": "2023-11-23",
        "end_date": "2023-11-23",
        "data": {
           "critical": 2,
           "high": 0,
           "medium": 0,
           "low": 0,
           "fully_protected": 0
        }
       }
    ]
   }
]
```

reports_risk_summary_get

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"
        }
    }
}
```

Four required properties are added for the ransomware object:

```
"required": [
    "ransomware"
],
    "properties": {
    "ransomware": {
        "type": [
        "object",
        "null"
     ],
    "required": [
            "num_total_workloads",
            "num_protected_workloads",
        "workloads_by_exposure",
        "risky_ports_by_severity",
        "risky_ports_by_category",
        "top_risky_applications",
        "top_risky_services",
        "num_risky_services",
        "num_unenforced_workloads",
        "last_updated_at"
```

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"
    }
   }
}
```

APIs that support Summary Reports

- report_schedules_post
- report_schedules_put
- reports_schedules_get
- report_templates_get
- reports_get

These five APIs are referencing `ransomware_risk_report_params` through the property `report_parameters`:

```
report_parameters: {
    "description": "Any specific parameters required for this
report template",
    "type": "object",
    "anyOf": [
        {
        "$ref": "executive_summary_report_params.schema.json"
        },
        {
        "$ref": "traffic_flow_report_params.schema.json"
        },
        {
        "$ref": "explorer_report_params.schema.json"
        },
        {
        "$ref": "ves_report_params.schema.json"
        },

        {
        "$ref": "ransomware_risk_report_params.schema.json"
        }
    ]
}
```

reports_time_series_statistics_post

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.

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
        }
    }
]
```

VEN Statistics 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 specific product version).

VEN information can include: "status", "version", "health", "condition", "os_id", "enforcement_mode", and "ven_type".

VEN Dashboard Reference

This topic contains properties and examples for the VEN dashboard.

Examples of VEN Dashboard APIs

vens_statistics_post

```
{
    "$schema": "http://json-schema.org/draft-04/schema#",
    "type": "object",
    "required": [
    "property_counts"
    ],
    "properties": {
    "property_counts": {
        "type": "array",
        "items": {
        "type": "object",
        "required": [
            "property"
        ],
        "properties": {
            "property": {
            "type": "string",
            "enum": [
                "status",
                "version",
                "health",
                "condition",
                "os_id",
                "enforcement_mode",
                "ven_type"
            ]
            },
            "values": {
            "type": "array",
            "items": {
                "type": "string"
            }
            },
            "filters": {
            "type": "array",
            "items": {
                "type": "object",
                "required": [
                   "filter_property"
                ],
            "properties": {
                "filter_property": {
                "type": "string",
                "enum": [
                    "status",
                    "version",
```

```
                    "health",
                    "condition",
                    "os_id",
                    "enforcement_mode",
                    "ven_type"
                ]
                },
                "values": {
                "type": "array",
                "items": {
                    "type": "string"
                }
                }
            }
            }
        }
        }
    }
    }
}
```

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 for `version` and `health`

```
{
    “property_counts”: [
       {
          "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
        }
        ]
    }
   ]
}
```


Sample Response for `ven_type`

```
[{
    property: "ven_type",
    total_filtered_count: 205,
    counts: [
        filtered_count:422,
        unfiltered_count: 424,
        value: "active",
    ]
}]
```

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

Illumio Segmentation for Data Centers Vulnerability Maps license is required to import Qualys report data into the Illumio PCE. For information about obtaining the 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]`

Vulnerability Reports

This Public Experimental API creates, updates, and deletes vulnerability reports.

NOTE

Illumio Segmentation for Data Centers Vulnerability Maps license is required to import Qualys report data into the Illumio PCE. For information about obtaining the 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 of vulnerability reports returned by a GET collection is 500. For more than 500 vulnerability reports, use Asynchronous GET Collections.

Delete a Vulnerability Report

To delete an individual vulnerability report, specify the last element of its HREF, which can be obtained from the response to `GET /vulnerabilities`.

Delete a Vulnerability

To delete an individual vulnerability, specify its HREF, which can be obtained from the response to `GET /vulnerabilities`.

Vulnerabilities API Reference

This topic contains properties and examples for vulnerability APIs.

Examples of Vulnerability APIs

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.

Parameter	Description	Data Type
`org_id`		Integer
`max_results`	The maximum number of vulnerabilities returned by a call to `GET /vulnerabilities`. (Optional. If not specified, all vulnerabilities are returned up to a maximum of 500.)	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`.

Request Parameter to delete a vulnerability

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
```

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. Enforced 100K maxitem limit.	String
`detected_vulnerabilities`	An array of parameters, of which `ip_address`, `workload`, and `vulnerability` are required. 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`.

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

Vulnerability Exposure per Enforcement Mode

Before release 24.4, the vulnerability APIs allowed users to calculate vulnerability exposure only for the full enforcement mode.

The two new and several changed common schemas now support multiple calculated values for vulnerability exposure for each enforcement mode.

The UI is updated to allow users to see the exposure scores for different enforcement modes without changing the workload's enforcement mode.

The other schemas reference these two new schemas.

common vulnerability_summary_exposure

```
{
    "$schema": "http://json-schema.org/draft-04/schema#",
    "type": "object",
    "description": "Vulnerability exposure details",
    "properties": {
        "vulnerable_port_exposure": {
            "description": "The aggregated vulnerability port
exposure score of the workload in the specified mode across
all the vulnerable ports",
            "type": ["integer", "null"]
},
    "vulnerability_exposure_score": {
        "description": "The aggregated vulnerability exposure
score of the workload in the specified mode across all
vulnerable ports",
        "type": ["integer", "null"]
        }
    }
}
```

common workloads_detected_vulnerabilities_exposure

```
{
    "$schema": "http://json-schema.org/draft-04/schema#",
    "type": "object",
    "description": "Vulnerability exposure details for
workloads",
    "properties": {
       "vulnerable_port_exposure": {
         "description": "The exposure of the port based on the
current policy for the specified enforcement mode",
         "type": ["integer", "null"]
    },
    "port_vulnerability_exposure_score": {
        "description": "The vulnerability exposure score
calculated for the port, based on the port exposure and
vulnerability for the specified enforcement mode",
        "type": ["integer", "null"]
        }
    }
}
```

APIs Affected

The following table shows the affected vulnerability APIs:

Table 8. Vulnerability API Changes

Method	URL	Description
GET	/orgs/:xorg_id//workloads/<:id>/detected_vulnerabilities	Four new columns are being added to the workload vulnerabilities tables in the UI to support comparing exposure and v-scores based on different enforcement types.
GET	/orgs/:xorg_id//workloads?representation=workload_labels_vulnerabilities	Four new columns are being added to the workload list tables in the UI to support comparing exposure and ve-scores for different enforcement types.
GET	/orgs/:xorg_id//workloads/:workload_id?representation=workload_labels_vulnerabilities	
GET	/orgs/:xorg_id/aggregated_detected_vulnerabilities	The vulnerability scores and summary scores are now in additional tables, and their scores are added to the response.
GET	/orgs/:xorg_id/app_groups	
GET	/orgs/:xorg_id/workloads/detailed_vulnerabilities	The vulnerability data in response is not computed at runtime but is taken from the database generated by the proper stats processor.

About Workload 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 pairing workloads, configuring pairing profiles, and obtaining pairing keys.

Workload Operations

This Public Stable API allows you to perform workload operations, such as creating an unmanaged workload, updating workload information, unpairing a workload, and deleting 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 it as suspended.	`PUT`	`[api_version]/workloads/workload_id`

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`

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 also 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_su
mmary.vulnerability_exposure_score%5Blte%5D=50
```

```
GET api/v2/orgs/:xorg_id/workloads?
representation=workload_labels_vulnerabilities&vulnerability_su
mmary.vulnerability_exposure_score%5Bgte%5D=50&vulnerability_su
mmary.vulnerability_exposure_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 as an HREF path when you get either a single workload 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 the JSON payload for changing a workload's policy state (called mode in the API) from its current state to enforced.

```
{"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]
```

Create an Unmanaged Workload

The Unmanaged Workload API enables you to create a workload without installing the VEN. This API is commonly used for Kerberos authentication between the VEN and the PCE.

URI to Create an Unmanaged Workload

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

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]
```

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 offline. 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 varying intervals, allowing the user to customize the timing and levels of notifications.

They are described in the schema `resource_canonical_representations`:

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 it. Unpairing a workload uninstalls the VEN from the workload so that it 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 VEN Unpair instead.

Workload Operations Reference

Learn about parameters, properties, and examples of workload operations.

Workload Operations 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
`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 value for last heartbeat on timestamp	Integer	No
`last_heartbeat_on[lte]`	Less than or equal to value for last heartbeat on timestamp	Integer	No
`log_traffic`	Whether we want to log traffic events from this workload	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

Parameter	Description	Type	Required
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
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 value for `vulnerability_exposure_score`	Integer	No
vulnerability_summary. vulnerability _exposure_score[lte]	Less than or equal to value for `vulnerability_exposure_score`	Integer	No

Workload Operations Properties

Property	Description	Type	Required
`deleted`	This workload has been deleted	Boolean	Yes
`name`	Interface name	String	Yes
`managed`	Return managed or unmanaged workloads using this filter. `True` if the workload is managed, else `false`	Boolean	Yes
`hostname`	Hostname of workload(s) to return. Supports partial matches	String	Yes
`service_principal_name`	The Kerberos Service Principal Name (SPN)	String	Yes
`public_ip`	The public IP address of the workload.	String	Yes
		Null	
`interfaces`	ref": "workloads_interfaces_get.schema.json		
`service_provider`	Name of the service source that is hosting the workload.	String	Yes
`data_center`	The name of the data center where the workload is being hosted.		Yes
`data_center_zone`	The zone inside the data center hosting the workload.	String	Yes
`os_id`	Unique OS identifier given by Illumio to the workload.	String	Yes
`os_detail`	Additional descriptive information about the workload OS	String	Yes
`online`	Indicates whether the workload is online and can communicate with the PCE.	Boolean.	Yes
`labels`	Labels that are attached to the workload: `href`, `key`, and `value`	Array.	Yes
`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`		Yes

Property	Description	Type	Required
`agent`	DEPRECATED AND REPLACED (USE 'ven' INSTEAD). Information about the agent that manages this workload.		Yes
`created_at`	The time (rfc3339 timestamp) at which this workload was created	String date/time	Yes
`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`		No
`detected_vulnerabilities`	Reference to `common/workloads_detected_vulnerabilities.schema.json`		No
`ven`	This section of the response returns the following data: • `href` • `hostname` • `name` • `status`		No
`container_cluster`	Reference to `common/compact_container_cluster.schema.json`		No
`ike_authentication_ certificate`	IKE authentication certificate for certificate-based Secure Connect and Machine Auth connections		No
`risk_summary`	Risk Summary for this workload. These properties have been added to the `workload-get` API to manage the features of the Ransomware Dashboard introduced in release 23.5. For `risk_summary` object , the required object is `ransomware`. and it has three required properties: • `workload_exposure_severity`: This property is referencing `/common/workload_exposure_severity.schema.json` • `ransomware_protection_percent`: description: "Ransomware protection percentage for this workload",	Object	No

Property	Description	Type	Required
	type: `number` • `last_updated_at`: description: "The time at which the ransomware stats are last computed at", type: `string` format: `date-time`		

Properties for Workload Disconnection

Property	Description	Type
`workload_disconnected_ timeout_ second`	Disconnected timeout in seconds	Integer
`workload_goodbye_time-out_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

Example of Computation States:

syncing: Workload is in 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"
},
```

Curl Command to Update a Workload

A workload state can be build, test, or enforced. This example shows how to use curl to update a workload policy state from its current state to enforced.

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}}}'
```

Example Payload for marking a workload as suspended

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 you how to use curl to mark a workload VEN as suspended.

This example assumes that 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"}}}'
```

Example payload for unmanaged workload

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"}'
```

Parameters to unpair a workload

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, depending on how old the iptables or WFP configuration was on the workload, VEN removal could adversely impact security. • `default`: Apply the recommended policy, which is to uninstall the VEN and allow only port 22 SSH connections to the workload. Safest from a security viewpoint, but if this workload is running a production application, it could break because this workload 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 or 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"}'
```

Workload Settings

This Public Stable API lets you retrieve network interface information for a workload, including all interfaces, or for an individual interface. You can also configure (create) or delete a 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 address the 24-hour hard-coded limit on the endpoint heartbeat.

If endpoints did not heartbeat for 24 hours, they were marked offline, and the endpoint timer was set to 24 hours. However, the 24-hour limit proved restrictive, so it was adjusted to support 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 offline endpoint, heartbeat, 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 heartbeaten to the PCE. Referencing the schema `settings_workload_detailed.schema.json`	Yes
`workload_goodbye_timeout_seconds`	The timer is triggered when a server or endpoint operation is performed (e.g., stop, disable). Referencing the schema `settings_workload_detailed.schema.json`	Yes
`workload_disconnected_ notification_seconds`	Time to wait with no heartbeat before emitting a warning. 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` to include additional information about the `ven_type`.

To ensure backend compatibility, the new ven_type field is optional. If it is missing from the request, the parameter is treated as a server parameter.

```
{
    "$schema": "http://json-schema.org/draft-04/schema#",
    "type": "array",
    "items": {
        "type": "object",
        "additionalProperties": false,
        "required": [
            "scope",
            "value"
        ],
        "properties": {
            "scope": {
            "$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
}
```

Workload Settings Reference

This reference provides examples of workload settings.

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 for all interfaces on a workload or an individual interface. You can also configure (create) or delete an individual network interface configuration.

Workload Interfaces Methods

Functionality	HTTP	URI
Request the list of the **workload_interfaces** (outside of the workloads or VENs scope). The `href` property in the API response is deprecated.	`GET`	`[api_version][workload_href]/interfaces`
Get an instance for the workload interface using 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 and 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 a workload's interfaces. You can retrieve workload interface information, including its connectivity status (up, down, or unknown), interface IP address, subnet mask size, default gateway IP address, and associated network.

URI to Get a Collection of a Workload's Network Interfaces

```
GET [api_version][workload_href]/interfaces
```

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
```

Workload Interfaces Reference

This topic contains properties and examples for workload interfaces.

GET Properties for workload interfaces

Property	Description	Type	Required
`name`	Interface name.	String	Yes
`address`	The IP address is 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`: The state of the interface is unknown.	String, Null	Yes
`network_detection _mode`	Network Detection Mode	String, Null	Yes
`friendly_name`	A user-friendly name is given to the interface.	String, Null	Yes
`network`	A network that the interface belongs to	Object, Null	Yes
`href`	DEPRECATED WITH NO REPLACEMENT	String	No

POST properties for workload interfaces

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`: The 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`	User-friendly name 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 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"
}
```

The 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 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 either **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

Bulk operations are rate-limited to 1,000 items per operation. You can only execute one such operation at a time when you create, update, or delete a collection of workloads (also called "bulk" operations). 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 that are not affected by policy changes transition from `Syncing` to `In Sync` after the VENs heartbeat. This process can take up to 5 minutes.

NOTE

Bulk operations are rate-limited to 1,000 items per operation.

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
```

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
```

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.

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 that users export a CSV file from the workloads page before they use this import function. Then, they can 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 CSV file 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 making actual changes to the workloads.

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 reconfigured in 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 IDs.

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 is allowed.
- Users can only upgrade VENs that are paired with 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_ver- sion[org_href] /soft- ware/vens/default`

Support VEN filtering in the PCE web console.	`GET`	`[api_ver- sion][org_href]/ vens/ autocomplete`
		
		`[api_ver- sion][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_ver- sion][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_ver- sion][org_href]vens/up- grade`
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; multiple images belong to the same version.	`GET`	`[api_version]/soft- ware/ven/releases`
Shows the complete list of VEN images. There is one image for each Linux distribution we support (such as RHEL and Ubuntu), plus images for Windows and macOS.	`GET`	`[api_version] /soft- ware/ ven/releases-im- ages`
Unpair a VEN: trigger the unpairing of one or more VENs. **Note:** This endpoint replaces `/workloads/unpair`, which is deprecated.	`PUT`	`[api_ver- sion][org_href]/vens/ unpair`
Provided so that users can set the default version for VEN pairing.	`PUT`	`[api_ver- sion][org_href]/soft- ware/vens/default`

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	Distribution
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	Distribution	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+endpoint". However, CentOS (Linux) supports a server-only VEN image, macOS supports an endpoint-only image, and Windows supports both server and endpoint:

Release	Distribution	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 appear 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 an `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 specifically for the OS.

GET VENs

To get a collection of VENs with a specific label applied, 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.

Network Enforcement Nodes (NEN) APIs

Network Enforcement Node Reassignment

`network_enforcement_nodes_put`

This API is used to change an agent's target PCE FQDN.

It updates the `target_pce_fqdn` property so that a different PCE can manage the NEN in a Supercluster.

Change Target PCE

When you have the NEN HREF, you can update the target PCE with the PCE FQDN that 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:'xxxxxxx5048a6a85ce846a706e134ef1d4bf2ac1f
253b84c1bf8df6b83c70d95' -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

Release 23.5.0 changes some of the existing experimental APIs to facilitate the creation of fully scripted endpoint management system integrations 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

In release 23.5.0, authorization of some NEN APIs was changed 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_ instructions _ applied_post	YES	"Global Policy Object Provisioner" and " Ruleset Provisioner"
network_devices_enforcement_ instructions_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", "Rule-set Viewer", "Workload Manager"
network_devices_multi_en-forcement_ instructions_ap-plied_post	YES	"Global Policy Object Provisioner" and " Ruleset Provisioner"
network_devices_multi_en-forcement_ instructions_re-quest_post	YES	"Global Policy Object Provisioner" and " Ruleset Provisioner"
network_devices_network_ endpoints_get	YES	NO
network_devices_network_ endpoints_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_no-des_get	YES	"Full Ruleset Manager", "Global Policy Object Provisioner", "Global Read On-ly", "Limited Ruleset Manager", "Ruleset Provisioner", "Ruleset Viewer", "Work-load Manager"
network_enforcement_nodes_ network_devices_post	YES	"Workload Manager"
network_enforcement_no-des_put	YES	NO

Configure VENs for Restart

This API was designed to control the VEN from the PCE and restart it without access to the server.

Using `vens_remote_action_put`, you can refresh the VEN's internal states and resolve cases where the VEN may not be fully operational.

Currently, this API allows for the remote VEN service to restart.

Restart VEN from the PCE

The new schema or VEN restart:

```
{
  "$schema": "http://json-schema.org/draft-04/schema#",
  "type": "object",
  "additionalProperties": false,
  "required": [
    "action",
    "vens"
  ],
  "properties": {
    "action": {
      "description": "Remote action type",
      "type": "string",
      "enum": [
        "restart"
      ]
    },
    "vens": {
      "description": "An array of VENs to restart",
      "type": "array",
      "minItems": 1,
      "maxItems": 1,
      "items": {
        "type": "object",
        "additionalProperties": false,
        "required": [
          "href"
        ],
        "properties": {
          "href": {
            "description": "VEN URI",
            "type": "string"
          }
        }
      }
    }
  }
}
```

To implement the schema, follow these steps:

1. Initiate the 'restart' action for a particular VEN to the PCE, which archives this remote action request for the VEN in a database.
2. The heartbeat response includes the 'restart' command upon receiving the VEN heartbeats.
3. The VEN processes the command and undergoes a restart operation.

4. During the subsequent heartbeat, the VEN transmits the timestamp of the last restart performed, which the PCE logs.

   At this point, the PCE designates this action request as fulfilled.

VEN Operations Reference

This topic contains parameters and examples for VEN operations.

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`	The 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	String	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	

Parameter	Description	Type	Required
`labels`	Labels assigned to the host that are managed by the VEN.	Array	
`interfaces`	Network interfaces of the host that are 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	
`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

VEN 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	

Parameter	Description	Type	Required
`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`	The array of container cluster URIs, encoded as a JSON string	Object	No
`secure_connect`	The issuer name match the criteria for the certificate used when 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	

Parameter	Description	Type	Required
`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`.	Object	
	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.	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	
`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 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	String	

Parameter	Description	Type	Required
	and is typically used during your security policy's building and testing phase. • `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 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.		
`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
`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	
`golden_image`	Indicates whether this VEN is a golden image The golden_image flag is added to prevent accidental deletion of images kept offline and used for cloning. Administrators now have the option to create a toggleable flag in the PCE interface to mark VEN as golden images.	boolean	No

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 to be returned and set a limit on how many results you want to be 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 with 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"}'
```

Pairing Profiles and Pairing Keys

The Public Stable API for pairing profiles gets, creates, updates, and deletes pairing profiles.

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 (activation code) at the end that securely identifies the VEN so it can authenticate with the PCE. You can configure a pairing key for one-time use or more, and 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 enables you to retrieve a collection of all pairing profiles in your organization or a specific pairing profile.

By default, the maximum number of pairing profiles returned in a GET collection is 500. For more than 500 pairing profiles, use Asynchronous GET Collection.

Create a Pairing Profile

This method creates an individual pairing profile. The only required parameter for the POST method is enabled; others are optional.

URI to Create a Pairing Profile

```
POST [api_version][org_href]/pairing_profiles
```

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]
```

Delete a Pairing Profile

To delete an individual pairing profile, specify its HREF, which you can obtain from a collection of pairing profiles.

URI to Delete a Pairing Profile

```
DELETE [api_version][pairing_profile_href]
```

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 to pass a pairing profile HREF 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
```

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 broadcast 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 Global Organization Owners can create/update/delete traffic collector settings, but more roles can read them.

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`

Filtering and Aggregating Traffic Reference

This topic contains properties and examples for filtering and aggregating traffic.

Parameters for Traffic Collector Methods

Parameters	Description	Type
`org_id`	Org ID	Integer
`traffic_collector_setting_id`	traffic_collector setting UUID	String

Properties for 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 “multicast” 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 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 that various filters can be created per organization without restarting the PCE.	Object Integer Integer String String

Property	Description	Type
data_source	Flow summary data source to support more granular filters, particularly for endpoints.	String
network	The Flow summary network supports more granular filters, for endpoints in particular.	String

Examples of Traffic Collector Methods

Curl Command for settings_traffic_collector_post

```
curl -i -u
api_10415cd5bcc0e14cc:'2ac31cbee8cd3e8fa7ca79d32d39a0249636624a
da675965dd2ec239e3ea8af0' --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:'21c10ea1a4ad38d76ef22977e8ac45bc10839c5c
c6ebffd650eae4f95dc5b364'--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:'21c10ea1a4ad38d76ef22977e8ac45bc10839c5c
c6ebffd650eae4f95dc5b364'--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"
            ]
            }
```

```
        }
    }
```

About Provisioning

Provisioning applies security policy changes from the Policy Compute Engine (PCE) to the Virtual Enforcement Nodes (VENs) on managed workloads.

When you provision updates, the PCE recalculates any changes to policies, IP lists, services, label groups, and security settings and then transmits those changes to all VENs installed on your 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 [361].

Provisioning API Methods

Functionality	HTTP	URI
Provision of 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
```

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 takes the form of 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]
```

Provisioning Reference (Public Stable)

This topic covers examples of public stable provisioning API.

Examples

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 provided message.

```
{
      "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, the draft changes should not be 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 the 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"
    }
}
```


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 un-provisioned 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.

See " Provisioning—Public Stable [355] " to provision security policy items and obtain information about one or more provisioned items.

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 allows 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 un-provisioned security policy item modifications (all un-provisioned `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 depend on other objects that need to be provisioned.	`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 require provisioning before they can affect managed workloads (workloads with a VEN installed). 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 with labels and rules for permitted communication between workloads and 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:** These are general network security settings, such as ICMP echo reply, allowing or disabling 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:** By narrowing the scope for segmentation, enforcement boundaries facilitate the implementation of allow lists, enabling users to achieve a high level of system maintainability using a simple policy mode.

When the security policy is provisioned, the PCE recalculates any changes 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
```

Revert All Items Pending Provisioning

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

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

Get Security Policy Dependencies

This public experimental API allows users to determine a policy object's provisioning (or revert) dependencies. An object also buckets the response JSON and has the exact schema change.

URI to Get Specific Security Policy Dependencies

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

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
```

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
```

Get Modified Items in a Provisioned Version

This method collects all modified policy items in a specific security policy version.

Every time the security policy is provisioned, it gets a version in the form of an HREF. You can obtain the HREF by 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
```

Provisioning (Public Experimental) Reference

This topic covers examples of public experimental APIs for provisioning.

Examples

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 a Specific List of Items Pending Provisioning

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

```
{
    "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:'26c55be6892762b65f27aacc795076767f16ffcd
7e9fde323a307e5fd286eb8d' -d '{"change_subset":{"rule_sets":
[{"href":"/orgs/1/sec_policy/draft/rule_sets/3"}]}}'
```

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. The request body represents each individual object of a specific type (for example, rule_sets) 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 of the 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.
Subproperties 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 services in the draft state to check for provisioning dependencies identified by service HREF.
`rule_sets`	List rulesets in the draft state to check for provisioning dependencies identified by rule_set HREF.
`ip_lists`	The list of IP lists in the draft state checks for provisioning dependencies identified by the IP list HREF.
`virtual_services`	List of virtual services in the draft state to check for provisioning dependencies identified by the 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 the virtual server HREF. Reference to `common/href_object.schema.json`
`firewall_settings`	Reference to `common/href_object.schema.json`

Parameter	Description
enforce-ment_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"
```

The response returns an empty array if there are no dependencies for either commit or revert.

```
[]
```

Curl command example: Get all modified items in a specific provisioned version

```
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 `modified_by` and `modified_at` have been deleted.

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.

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"
        }
    }
    ],
    "destinations": [
        {
        "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. 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"
        }
    }
}
```

Events Administration

Abstract

Events Administration guide provides information on how to administer your PCE deployment: an overview of events and SIEM integration, event setup, event record formats, and event types by resource.

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

Before reading this guide

Illumio recommends that you be familiar with the following technology:

- Solid understanding of the Illumio Core
- Familiarity with syslog
- Familiarity with your organization's Security Information and Event Management (SIEM) systems

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

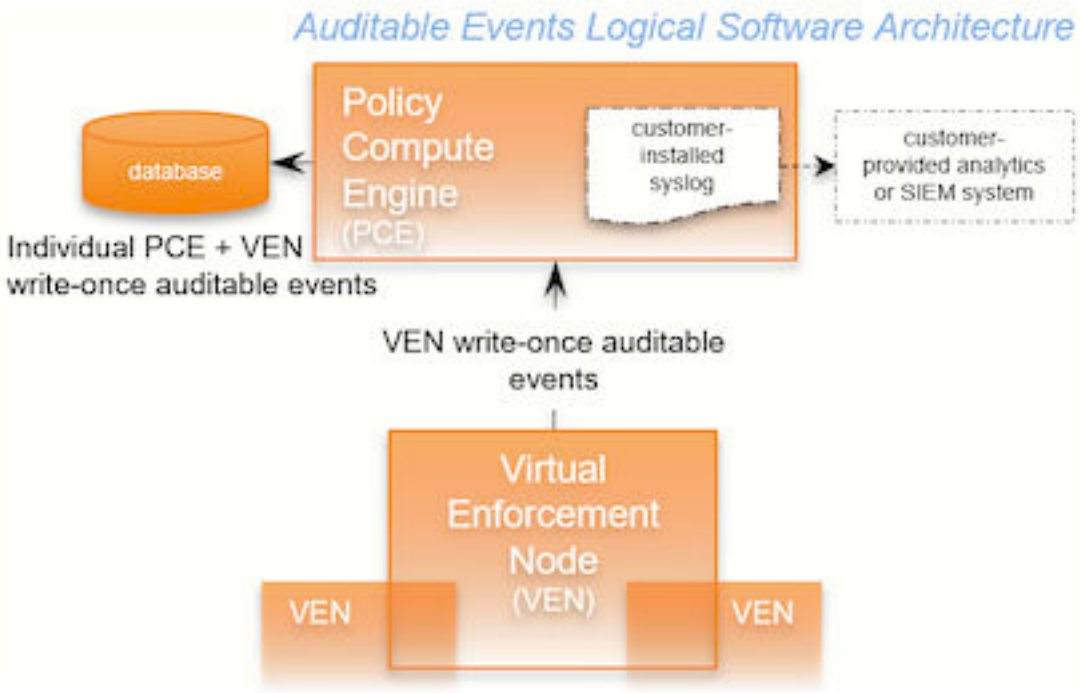
The Illumio events framework provides an information-rich, deep foundation for actionable insights into the operations of Illumio Segmentation for Data Centers

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 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
Audit and Compliance	Evidence to show that resources are managed according to rules and regulatory standards.
Resource Lifecycle Tracking	All information is necessary to track a resource through creation, modification, and deletion.
Operations	Trace of recent changes to resources.
Security	Evidence to show which changes failed, such as incorrect user permissions or failed authentication.

Benefits of Events Framework

The events framework 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 integration
  - 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 Illumio Segmentation for Data Centers

Events Lifecycle for Resources

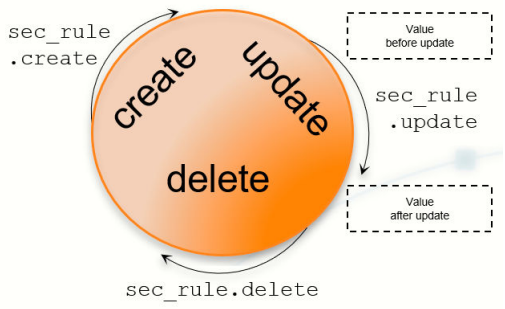
Illumio resources progress through the lifecycle stages (creation, updating, deletion) and the Illumio Segmentation for Data Centers records them with the appropriate event types.

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`

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

Illumio Segmentation for Data Centers includes the following general categories of auditable events:

- Organizational events: Organizational events are further grouped by their source:
  - API-related events: Events occurring from the 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 REST API schemas' zipfile. Go to the Develop category > REST API Public Schemas (Archive File)from the documentation portal's Home page.

Event Syntax

The names of recorded auditable events 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 an event record, which answers the who, what, where, how, and when:

Type of information	Description
Who	• VEN identified by hostname and agent 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, the exception type and the exception message.
	  • All failures related to security, such as authentication and authorization.
	  • Severity as INFO, WARNING, or 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`	The exact time that the event occurred was in RFC 3339 format, which included fractional seconds.
`pce_fqdn`	The PCE's fully qualified domain name is especially useful for Supercluster deployments or if multiple PCEs send data to the SIEM server.
`created_by`	Identifies the event's creator, a user, the system, or a workload.
`event_type`	Name the event; see the List of Event Types table for more information.
`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 PCE Organizational events. For example, Organizational events capture actions such as users logging in and logging out, 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 to act 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 a website's trust for a user.

For more details on this attack, see the CSRF article on the Web Application Security Consortium website.

Illumio Segmentation for Data Centers 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 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 software.

IMPORTANT

When this event occurs, you should immediately investigate the issue because the request might not have originated from a valid user.

Events Monitoring Best Practices

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 Segmentation for Data Centers events are structured and actionable. Using the event data, you can identify the severity, affected systems, and what triggered the event.

Illumio Segmentation for Data Centers 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 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 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 recommends 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"`	This document contains the information necessary to identify workloads with lost agents. A lost agent occurs when the PCE deletes a workload from its database but 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.
`event_type="system_task.agent_missed_heartbeats_check"`	Lists the VENs that missed three heartbeats (default: total of 15 minutes). Typically, this event precedes the PCE taking the VENs offline to perform internal maintenance. For Server VENs, 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 Server VEN has not sent a heartbeat for 15 minutes; if the offline timer is configured to 4 hours, an alert is sent after the Server VEN hasn't sent a heartbeat for 1 hour. Alerts are disabled by default for Endpoint VENs. **Recommendation:** Monitor these events for high-value workloads. The PCE can take these workloads offline when the VENs miss 12 heartbeats (usually 60 minutes).
`event_type="system_task.agent_offline_check"`	This event 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 a change in the affected workloads' security posture.
`event_type="agent.suspend"`	This event indicates that the VEN is suspended and no longer protecting the workload. If you did not intention-

Events	Description
	ally run the VEN suspend command on the workload, this event can indicate the workload is under attack. **Recommendation:** Monitor these events for high-value workloads.
`event_type="agent.tampering"`	This event indicates tampering with 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 event's cause. **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"`
	Illumio Segmentation for Data Centers 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"`
	These events contain labels indicating when all workloads are affected, all services, or a label/label-group is used as a rule source or destination.

`event_type="sec_rule.delete"`	Illumio Segmentation for Data Centers generates these events when you create, update, or delete a draft ruleset. The removed or added labels could represent high-value applications or environments.

Events	Description
	Recommendation: Monitor these events for high-value labels.
`event_type="sec_policy.create"`	Illumio Segmentation for Data Centers contains the `workloads_affected` field, including the number of workloads a policy affects. This event is generated when you provision a draft policy, updating the policy for 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 affected workloads. If the number exceeds an acceptable threshold, investigate the associated policy.
`event_type="agent.clone_detected"`	The PCE detects cloned VENs based on clone token mismatch. The volume of these events makes the severity level important, 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 detecting 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.

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": [{
"source": true,
"actors": "ams"
}]
},
"destinations": {
"created": [{
"source": false,
"actors": "ams"
}, {
"source": 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 the 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
```

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 [413].

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.goodbye	Agent disconnected
agent.machine_identifier	Agent machine identifiers updated
agent.refresh_token	Agent refreshed token
agent.refresh_policy	Success or failure to apply policy on VEN
agent.request_upgrade	VEN upgrade requested
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_cont ainers	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

JSON Event Type	Description
api_key.create	API key created
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_services	Container cluster services updated as 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_autoclean-up_started	DB temp table cleanup started.
database.temp_table_autocleanup_com-pleted	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

JSON Event Type	Description
`enforcement_boundary.update`	Enforcement boundary updated
`event_settings.update`	Event settings updated
`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 created or updated.

JSON Event Type	Description
`login_proxy_ldap_config.create`	Interservice call to the login service to create the LDAP config.
`login_proxy_ldap_config.delete`	Interservice call to the login service to delete the LDAP config.
`login_proxy_ldap_config.update`	Interservice call to the login service to update the LDAP config
`login_proxy_ldap_config.verify_connection`	Interservice call to the login service to verify the connection to the LDAP server.
`logout_from_jwt`	User logged out
`lost_agent.found`	Lost agent found
`network.create`	Network created
`network.delete`	Network delete
`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.network_devices_network_endpoints_workloads`	Workload added to the network endpoint.

JSON Event Type	Description
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
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 the 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
request.authentication_failed	API request authentication failed

JSON Event Type	Description
request.authorization_failed	API request authorization failed
request.internal_server_error	API request failed due to an internal server error
request.service_unavailable	API request failed due to an unavailable service
request.unknown_server_error	API request failed due to an 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 destination services updated
saml_config.create	SAML configuration created
saml_config.delete	SAML configuration deleted
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
secure_connect_gateway.create	SecureConnect gateway created

JSON Event Type	Description
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_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
slb.create	Server load balancer created
slb.delete	Server load balancer deleted.
slb.update	Server load balancer updated.
support_report_request.create	Support report requested
support_report_request.delete	Deleted a request for a support report
support_reports	Support report added
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	The agent missed heartbeats.
system_task.agent_offline_check	Agents marked offline
system_task.prune_old_log_events	Event pruning completed

JSON Event Type	Description
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
user.login_session_terminated	User login session terminated.
user.logout	User logged out
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 an expired password.
user_local_profile.create	User local profile created.
user_local_profile.delete	User's local profile deleted.
user_local_profile.reinvite	Invitation email resent for the local user.
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

JSON Event Type	Description
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
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 created or updated.
workload.create	Workload created
workload.delete	Workload deleted
workload.online	Workload online
workload.recalc_rules	Workload policy recalculated
workload.redetect_network	Workload network re-detected
workload.undelete	Workload undeleted
workload.update	Workload settings updated
workload.upgrade	Workload upgraded
workload_interface.create	Workload interface created

JSON Event Type	Description
workload_interface.delete	Workload interface deleted
workload_interface.update	Workload interface updated
workload_interfaces.update	Workload interfaces updated For example, IP address changes, a new interface is added, and an interface shuts down.
workload_service_report.update	Workload service report updated
workload_settings.update	Workload settings updated
workloads.apply_policy	Workload 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.
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

View and Export Events

You can view events by default in the PCE web console or 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 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 those that interest you most. You can search for Organization events by their universally unique identifier (UUID) and filter events by 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. You can filter events by criteria such as severity, status, timestamp, or who generated them.

NOTE

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	

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 the PCE Web Console

You can export all Organization events or export a filtered list of organization events to a CSV file.

https://product-docs-repo.illumio.com/Tech-Docs/Animated+GIFs/Export+Events+using+PCE+Console.mp4

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 events, filter the list and then click **Export** > **Export Filtered** to export only the filtered view.
4. Use the search filter for events based on event type, severity, status, timestamp, and who generated them.

Events Settings

The following section describes configuring the Events Settings in the PCE web console.

NOTE

Information about Event Settings applies only to the on-premises PCE.

Events Are Always Enabled

Events are enabled by default in the PCE and cannot be disabled by 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, ranging from 1 day to 200 days, with a default period of 30 days.
- **Event Pruning:** The system automatically prunes events based on disk usage and their age; events older than the retention period are pruned. When pruning is complete, the `system_task.prune_old_log_events` event is recorded.
- **Event Format:** This setting sets the message output to one of three formats. The selected message output format only applies to messages sent over Syslog to an 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	This should be corrected immediately.
Critical	Critical conditions
Error	Error conditions
Warning	Might indicate that an error will occur if action is not taken
Notice	Unusual events, 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 remain recorded in JSON.

Set Event Retention Values

You can set the event retention values depending on the specific conditions described below.

If you use an 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. When setting it to 7 days, you can use the PCE Troubleshooting or Events Viewer to troubleshoot and diagnose events quickly. The benefit of setting it to 7 days is that if an issue occurs on a Friday, it can still be diagnosed the following Monday. Many events are generated in a dynamic environment, increasing the data stored (disk space used), backup size, etc. 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, such as the usage of APIs, ETL, Containers, and so on.

If you use a SIEM in a non-dynamic environment, consider setting the event retention period to 30 days. In a non-dynamic environment, fewer events are generated, and less disk space is used.

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 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 the primary storage of events is not on the PCE	7 days (PCE troubleshooting) 1 day (minimum)
No: Not primary storage for events	If events are stored primarily on the PCE, consider the organization's record retention policy and 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 outputs 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 the 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

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 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

  When the soft limit is reached, aggressive pruning is triggered. 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" 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.

Requirements for Events Framework

To use the events framework, 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 of 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 information about the default events data retention period, database dumps with and without events data, disk compacting, and more, see Manage Data and Disk Capacity in the PCE Administration Guide.

Events Preview Runtime Setting

If you participated in the preview of Events in 18.1.0, you enabled it 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 will not succeed.

Removing this preview parameter does not affect the ongoing recording of "organization events" records.

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 other previews, you can also remove the line `enable_preview_features`.

2. Save your changes.

SIEM Integration for Events

Event data can be sent using syslog to your own analytics or SIEM systems for analysis or other needs.

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) is needed for SIEM applications like Splunk®.
- Common Event Format (CEF) is needed for Micro Focus ArcSight®.
- Log Event Extended Format (LEEF) is needed for IBM QRadar®.

Illumio Tools for SIEM Integration

Illumio offers other tools for SIEM integration.

Illumio App for Splunk:

- Software: Technical Add-on for Illumio and Illumio App for Splunk
- Documentation: Illumio App for Splunk Guide 4.x

Illumio App for QRadar:

- Software: Illumio App for QRadar
- Documentation: Illumio App for QRadar Guide 1.4.0

Illumio App for ServiceNow:

- Software: Illumio App for CMDB
- Documentation: Illumio App for ServiceNow 2.1.0

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:

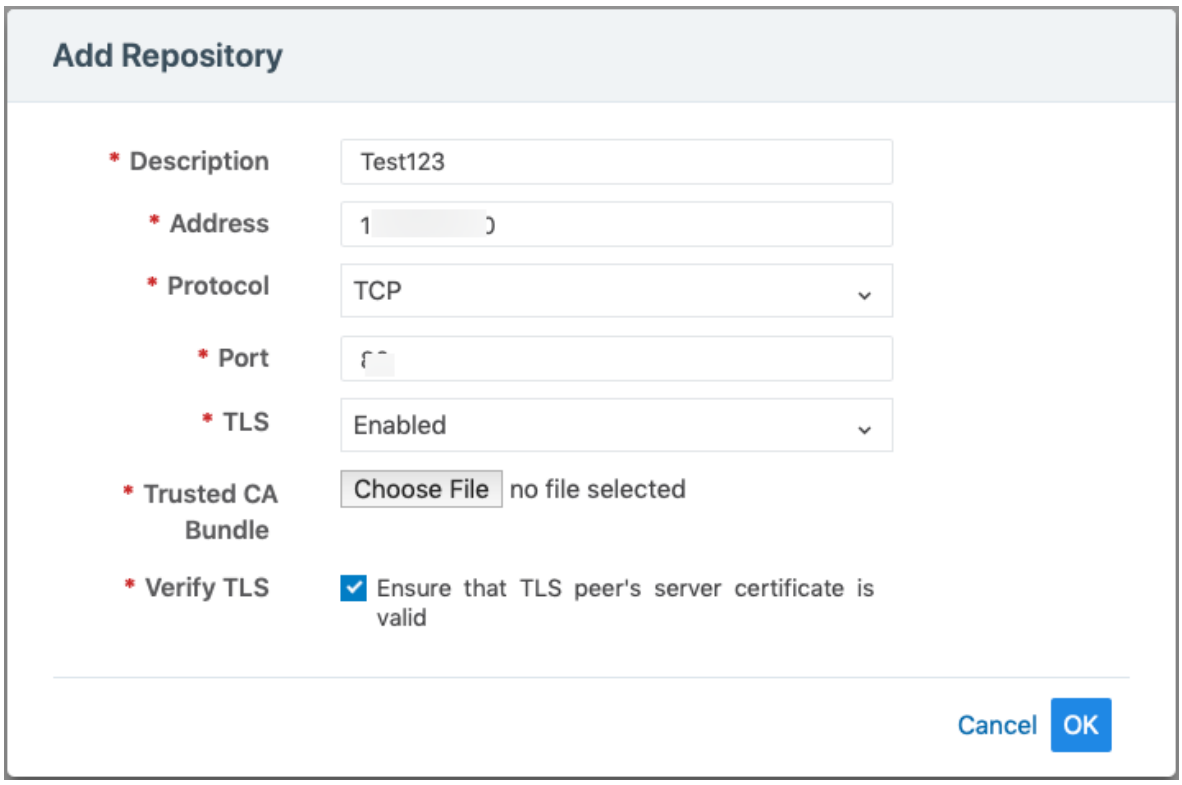
```
"version":2

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 are 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 the 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 the 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 where it is stored.

     The Trusted CA Bundle contains all the certificates 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 the TLS peer’s server certificate is valid.
5. Click **OK**.

After ensuring that the events are being forwarded as configured to the correct external Syslog servers, you can stop using the “Local” server by editing the local server setting and deselecting all message types.

NOTE

You cannot delete the “Local” server.

Disable Health Check Forwarding

PCE system health messages are helpful for PCE operations and monitoring. If they are needed at the remote destination, you can choose to forward them.

For example, IBM QRadar is usually used by security personnel who might not need to monitor the health of the PCE system. The Illumio App for QRadar does not process the PCE system health messages.

The PCE system health messages are only 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.

https://product-docs-repo.illumio.com/Tech-Docs/Animated+GIFs/Disable+Health+Check+Forwarding.mp4

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 health messages in the system. If you are using either of these for SIEM, do not select the System Health Messages checkbox.

Showing Rule ID in Syslog

For large customers handling 10K+ messages per second, including rule IDs in the Syslog events will substantially increase the volume of recorded data.

In release 25.1.0, an organization-level feature flag `rule_info_exposure_to_syslog` (disabled by default) was added. This flag controls whether rule ID information is included in the syslog messages:

`rule_info_exposure_to_syslog`

To add the rule IDs to the syslog events, the API `optional_features_put` was changed by adding the new property `rule_info_exposure_to_syslog`.

To provision the firewall settings via the PCE console, follow these steps:

1. In the PCE console, go to **Settings > Event Settings** .
2. In the Event Settings dialog, click Add next to Event Forwarding.
3. Select **Local**.
4. Select check boxes for all events: Organizational Events, System Events, Allowed, Potentially Blocked, Blocked, and System Health Messages.
5. Click **Save**.

Enabling the Rule Data via API

To set the flag `enable_all_rule_hit_count_enabled` via API, use the following CURL command:

```
curl -u api_${ILO_API_KEY_ID}:${ILO_API_KEY_SECRET}
-H "Content-Type: application/json" -X
PUT -d '{"rule_hit_count_enabled_scopes":
[[]]}' https://${ILO_SERVER}/api/v2/orgs/${ILO_ORG_ID}/
sec_policy/draft/firewall_settings
```

For more details about using the Rule ID feature using the API, see Showing Rule ID in Syslog.

Traffic Flow Types and Properties

Visibility Settings

The table below indicates whether or not a traffic summary is logged as Allowed, Blocked, or Potentially Blocked according to a workload's visibility setting.

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 that the attribute might not appear in the summary.

Event Attributes	Allowed (pd=0)	Potentially Blocked (pd=1)	Blocked (pd=2)
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*	✓	✓	✓

Showing the Data Transfer Amount

The JSON, CEF, and LEEF for the accurate byte count work events are related to the 'Show Amount of Data Transfer' preview feature, which is available with the 20.2.0 release.

The PCE now reports the amount of data transferred into and out of workloads and applications in a data center. The number of bytes sent and received by an application's source is provided separately. These values can be seen in traffic flow summaries streamed from the PCE. You can enable this capability on a per-workload basis in the Workload page. You can also enable it in the pairing profile to directly pair workloads into this mode.

The direction reported in the flow summary is from the viewpoint of the source of flow:

Destination Total Bytes Out (

```
dst_tbo
```

): Number of bytes transferred out of source.

Destination Total Bytes In (

```
dst_tbi
```

): Number of bytes transferred to source.

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`

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":"2017-0
8-16T13:23:57-07:00",
"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":"corp-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":"172.1
6.40.5",
"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_hostname":
"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,"d
st_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
```

Export Traffic Flow Summaries

Decide where to export the traffic flow summaries: Syslog or Fluentd.

> **CAUTION**
>
> By default, the PCE generates all traffic flow summaries and sends them to Syslog.
>
> If you have not configured Syslog, the Syslog data is written to a local disk by default. 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** > **Events Settings**.
2. Enable a remote Syslog destination.
3. Select specific traffic flow summaries to be sent to the remote syslog.

This filters the selected traffic flow summaries and sends 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.

NOTE

The generation of all traffic flow summaries is implemented to ensure that they can be controlled only from the PCE web console.

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 the local, which sends to the 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 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

VENs send two attributes to the Syslog and fluentd output. These 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 lets you 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.

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. The default is approximately 600 seconds (10 minutes), depending on the VEN's ability to report traffic and the 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 is associated with the first flow in the summary. This value exists only if the protocol is ICMP (1). Example: 3 for "Destination Unreachable."	Integer	No	Minimum=0 Maximum=255
`code`	The ICMP message code (subtype) is associated with the first flow in the summary. This value exists only if the protocol is ICMP (1). Example: 1 for "Destination host unreachable."	Integer	No	Minimum=0 Maximum=255
`dst_port`	Destination port. This value exists only if the protocol is not TCP (6) or UDP (17).	Integer	Yes	Minimum=0 Maximum=65535

Property	Description	Type	Required	Possible Values
`pd`	This is the 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, specifically those 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`	The session state for the traffic flows is in the flow summaries. Possible values: • **Active (A):** The connection was still open when the flow summary was logged. This applies to allowed and potentially blocked flows. • **Closed (C):** (Linux only) The connection was closed when the flow summary was logged. Applies to allowed and potentially blocked flows.	String	No	A, C, T, S, N

Property	Description	Type	Required	Possible Values
	• **Timed out (T):** The Connection timed out when 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 when 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 associated with a new connection. Applies to blocked TCP flows. The value is empty for blocked UDP flows.			
pn	The program name is associated with the first flow of the summary. It is supported on inbound flows for Linux and Windows VEN and 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 that this value might represent only the first process detected across all aggregated flows. No process is associated if network communication is done by an OS component (or a driver).	String	No	
un	The username is associated with the first flow of the summary. It is supported on inbound flows for Linux and Windows VEN and outbound flows for only Linux VEN. On Windows, it can include the username of the user account that initiated the connection.	String	No	

Property	Description	Type	Required	Possible Values
	 **NOTE** This information might not be available on short-lived processes.			
`sn`	The service name associated with the first flow in the summary 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.	Object	No	
	 **NOTE** The `src_hostname`, `src_href`, and `src_labels` values are not included in a traffic summary if the source of the flow is not an Illumio-labeled workload, such as Internet traffic or a managed workload without any labels applied.			
`dst_hostname`	Hostname of the destination workload that reported the flow.	String	No	
`dst_href`	HREF of the destination workload that reported the flow.	String	No	
`dst_labels`	Labels applied to the destination workload.	Object	No	
	 **NOTE** The `dst_hostname`, `dst_href`, and `dst_labels` values are not included in a traffic summary if the flow's destination is not an Illu-			

Property	Description	Type	Required	Possible Values
	mio-labeled workload, such as Internet traffic or a managed workload without any labels applied.			
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 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 subproperties 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 vulnerability scores 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

Legal Notice

Resources

- Legal information
- Trademarks statements
- Patent statements
- License statements

Contact Information

- Contact Illumio
- Contact Illumio Legal
- Contact Illumio Documentation