API Guide for Content Analysis 3.0 and Malware Analysis

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Legal Notice

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Content Analysis APIs

Content Analysis offers three Application Programming Interfaces (APIs):

- REST Application Programming Interface for submitting files for scanning
- REST Application Programming Interface for performing malware analysis functions
- Publish-Subscribe Application Programming Interface (Pub-Sub API) to provide notification about tasks and scanning verdicts

> **Tip:** To see a complete list of API functions for performing malware analysis, go to the following URL:
> https://<*appliance_IP_address*>:8082/rapi/system/documentation

This manual is intended for malware analysts, researchers, and security practitioners who are using Content Analysis for content scanning and malware analysis. This manual assumes that the reader is well versed in network terminology and operations, and is familiar with malware in general and malware analysis in particular. An understanding of Windows system events and network intrusion techniques is helpful as well.

Generate an API Key

Authentication to the API is provided using unique authentication tokens (API keys) matched to specific users and access roles.

Example API key: **3970ae9b89b6402da1b706435d56006c**

- Administrators can create and manage API keys using one of two methods:
  - Using the RAPI function **POST: /rapi/system/users/api_keys**. (See "Create an API Key" on page 11 .) You must generate an API key for an administrator-level account before using this method.
  - Using **ma-actions api-key** in the command-line interface, as shown below.
- An API key can be generated for any existing user.
- You must specify a **role** for the user. The role can be different from the user role in the web UI. See Authenticate Users with Local Credentials in the *Content Analysis WebGuide* on **Broadcom Tech Docs** for a list of API-eligible roles.
- By default Content Analysis will generate a key, or you can specify your own (with the **value** parameter in the CLI and **new_api_key** for the RAPI) as long as it is 32 hexadecimal characters.
- You have the option of providing a label for the API key using the **description** parameter in the CLI or **label** with the RAPI. Enclose the string "in quotation marks."

Generate the Key Using the Command Line Interface

- For more information consult ma-actions api-key in the *Content Analysis CLI Guide* on **Broadcom Tech Docs**.

1. Connect to the serial console or SSH to the Content Analysis appliance as a user with administrative privileges and enter enable mode.
2. Enter the boldfaced commands below:

   ```
   # ma-actions api-key create user <username> role <role>

   Note that keys are not stored on the system in plain text and cannot be retrieved later.
   Created new API Key: <API_key> (Key ID <ID>)
   ```

3. Copy the generated API key and its ID and save it in a text file, because the key cannot be viewed later.

Create an API Key

Generate an API key for a user and assign a role. Optionally, supply a label and user-defined API key. The **X-API-TOKEN** must be an administrator-level key.

Tip: To manage existing API keys run **ma-actions api-key** from the command line in enable mode.

Syntax

```
$ curl -X POST "X-API-TOKEN:<admin-API-key>" -d
"user=<username>&roles=<role>&label="<string>"&new_api_key=<api_key>" https://<CA-
host>:8082/rapi/system/users/api_keys
```

HTTP Parameters

`role`	Role type for new key. This role can be different from the user's role in the web UI. Valid values: **`sysconfig`**, **`super-analyst`**, **`guest`**, **`observer`**, **`write-only`**, **`analyst`**, **`administrator`**. See Authenticate Users with Local Credentials in the *Content Analysis WebGuide* on **Broadcom Tech Docs** for an explanation of the roles.
`username`	Existing local user
`label`	Optional descriptor for the key. Enclose "in quotation marks"
`new_api_key`	Optional user-provided key value; must be 32 hexadecimal characters

Example

```
$ curl -X POST "X-API-TOKEN:8a09a20292404ea182f46e42db2bab41" -d "user=apiuser&roles=write-
only&label="Key for API Users"&new_api_key=aaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaa"
https://203.0.113.17:8082/rapi/system/users/api_keys
```

HTTP Return Value

```
{
      "api_version": 9,
      "exec_time": 0.077,
      "request": "POST /system/users/api_keys",
      "results": [
            {
                  "api_keys_api_key": "<key>",
                  "api_keys_date_added": "<YYYY-MM-DD>T<hh:ii:ss>",
                  "api_keys_key_id": "<ID>",
                  "api_keys_label": "<string>",
                  "api_keys_privileges": <integer>,
                  "api_keys_roles": "<role>",
                  "users_username": "<username>"
            }
      ],
      "results_count": 1,
      "server_time": "<YYYY-MM-DD>T<hh:ii:ss>.99999"
}
```

Lost API Keys

API keys are not stored in clear text in the system database. For security reasons, only a one-way hash value is stored. If a key is lost, it is impossible to retrieve it. In this situation, a user with an Administrator or a Super Analyst role should delete the lost key (if it is identifiable via the UID and role), or delete and recreate all keys belonging to that user.

When a new key is created, the key is communicated to the administrative user in the output of the ma-actions api-key **create** CLI command. The administrator must then provide the user with the key via an external mechanism and it is the user's responsibility to securely store their key external to Content Analysis.

API Client Environment

The examples in this document use *cURL*, an open-source library and command-line tool for transferring data using various protocols with URL syntax. It supports DICT, FILE, FTP, FTPS, Gopher, HTTP, HTTPS, IMAP, IMAPS, LDAP, LDAPS, POP3, POP3S, RTMP, RTSP, SCP, SFTP, SMTP, SMTPS, Telnet and TFTP. cURL also supports SSL certificates, HTTP POST, HTTP PUT, FTP uploading, HTTP form based upload, proxies, cookies, and user/password authentication.

The examples use cURL because it's easier to demonstrate API usage through the cURL command-line tool rather than to include source code. However, you can access the Content Analysis and Malware Analysis APIs with your preferred coding tool.

Pass API Keys to REST API

Once you have generated an API key, you can use it to authenticate REST API calls. To append an **X-API-TOKEN** header for HTTP requests, the cURL command would be:

```
curl -H "X-API-TOKEN:<api-key>" https://mag2host/rapi/tasks
```

For example, if the API key is **a2f26f1c84084eb4b1c4a694aa8ae9e6**:

```
curl -H "X-API-TOKEN:a2f26f1c84084eb4b1c4a694aa8ae9e6" https://<CA_host>/rapi/tasks
```

REST API for Malware Analysis Operations

The full-featured Malware Analysis Application Programming Interface (API) can perform the operations in the Malware Analysis tab as well as additional functionality.

The API supports basic and advanced integration and automation goals including: multi-step workflow processes; integration into anti-malware solution suites; integration into extended security infrastructures; and context, correlation, and enrichment processes. Content Analysis supports generic data exchange with external systems via a well-defined event schema that is accessible through the API via Python, cURL, Ruby, and many other common programming languages.

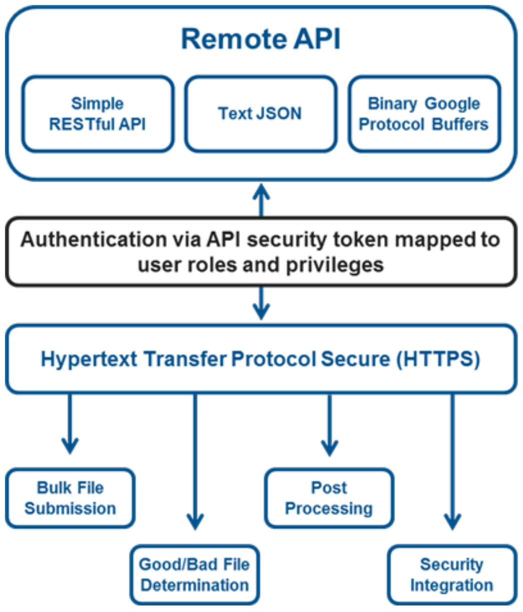
Common API uses include:

- Bulk file submission for analysis
- Good-bad file determination for white/black lists
- Submit custom tasks to multiple analysis environments (SandBox, IntelliVM profile, MobileVM profile)
- Assign priorities to sample tasks (High, Medium, Low)
- Automatically submit dropped files for analysis
- Conditional processing based on risk scores or behavioral indicators
- Post-processing of analysis artifacts using third-party tools
- Inclusion of other tools as part of the core analysis process (such as VirusTotal counts, YARA signatures)
- Back-end for other processes (for example, checking attachments before uploading to Salesforce.com)
- Integration into coordinated product suites with other tools and appliances
- Enhance analysis with context, correlation, and enrichment processes

MA API Architecture

The API is built using well-known open standards to facilitate interaction with a wide range of commonly used tools. It is designed according to the Representational State Transfer (REST) API standard, an architectural style consisting of a coordinated set of constraints applied to components, connectors, and data elements, within a distributed hypermedia system.

The API returns data records in standard JavaScript Object Notation (JSON) format. For returning binary files, the MA API uses Google Protocol Buffers (GPB), a standard method of serializing structured data in a language-neutral, platform-independent, extensible way. Protocol buffers allow for flexible, efficient, and automated storage of nearly any type of data. Malware analysts frequently retrieve analysis resources from Malware Analysis for further inspection including screen shots, HTTP archives, sample binaries, and PCAP files through the API using GPB. The GPB filename extension is **.proto**.


Remote API
Simple RESTful API
Text JSON
Binary Google Protocol Buffers
Authentication via API security token mapped to user roles and privileges
Hypertext Transfer Protocol Secure (HTTPS)
Bulk File Submission
Good/Bad File Determination
Post Processing
Security Integration

Common Malware Analysis API Functions

The Malware Analysis API enables a rich array of dynamic functionality that is limited only by programming ability and imagination.

It is impractical to detail all possible API usage implementations, so we provide a diverse, core set of examples to enable productive usage of API functionality and jump-start learning of higher-level tasks.

Create an API Key

Generate an API key for a user and assign a role. Optionally, supply a label and user-defined API key. The **X-API-TOKEN** must be an administrator-level key.

> **Tip:** To manage existing API keys run **ma-actions api-key** from the command line in enable mode.

Syntax

```
$ curl -X POST "X-API-TOKEN:<admin-API-key>" -d
"user=<username>&roles=<role>&label="<string>"&new_api_key=<api_key>" https://<CA-
host>:8082/rapi/system/users/api_keys
```

HTTP Parameters

`role`	Role type for new key. This role can be different from the user's role in the web UI. Valid values: **`sysconfig`**, **`super-analyst`**, **`guest`**, **`observer`**, **`write-only`**, **`analyst`**, **`administrator`**. See Authenticate Users with Local Credentials in the *Content Analysis WebGuide* on **Broadcom Tech Docs** for an explanation of the roles.
`username`	Existing local user
`label`	Optional descriptor for the key. Enclose "in quotation marks"
`new_api_key`	Optional user-provided key value; must be 32 hexadecimal characters

Example

```
$ curl -X POST "X-API-TOKEN:8a09a20292404ea182f46e42db2bab41" -d "user=apiuser&roles=write-
only&label="Key for API Users"&new_api_key=aaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaa"
https://203.0.113.17:8082/rapi/system/users/api_keys
```

HTTP Return Value

```
{
      "api_version": 9,
      "exec_time": 0.077,
      "request": "POST /system/users/api_keys",
      "results": [
            {
                  "api_keys_api_key": "<key>",
                  "api_keys_date_added": "<YYYY-MM-DD>T<hh:ii:ss>",
                  "api_keys_key_id": "<ID>",
                  "api_keys_label": "<string>",
                  "api_keys_privileges": <integer>,
                  "api_keys_roles": "<role>",
                  "users_username": "<username>"
            }
      ],
      "results_count": 1,
      "server_time": "<YYYY-MM-DD>T<hh:ii:ss>.99999"
}
```

Shut Down or Restart System

Shut down or restart the Content Analysis appliance.

Syntax

```
$ curl -X POST https://<CA-host>/rapi/system/shutdown

$ curl -X POST https://<CA-host>/rapi/system/reboot
```

HTTP Return Value

`JSON`

HTTP URL

`/system/shutdown`

`/system/reboot`

Submit Sample File

Submit a new basic sample. Parameters must be encoded using **multipart/form-data** and not **application/x-www-form-urlencoded**.

Syntax

```
$ curl -X POST --form upload=@<filename> --form "owner=admin" --form
"extension=jpg" https://<CA-host>/rapi/samples/basic
```

HTTP Return Value

`JSON`

HTTP Parameters

`source`	Source of sample. Default = **www**
`resource_id`	Create sample using existing sample_resource
`file`	Multipart form-data file attachment
`owner`	Owner of sample
`label`	Label of sample
`target_name`	Override file name
`description`	Free-form text description
`extension`	Override file extension
`exec_arguments`	Override default execution arguments

HTTP URL

`/samples/basic`

Submit Sample URL

Submit a sample URL.

Syntax

```
$ curl -X POST -d "url=http://<URL>/" https://<CA-host>/rapi/samples/url
```

HTTP Return Value

`JSON`

HTTP Parameters

`source`	Source of sample. Default: www
`exec_arguments`	Override default execution arguments
`owner`	Owner of sample (required)
`label`	Label of sample
`description`	Free-form text description
`url`	URL of sample

HTTP URL

`/samples/url`

Create Task

Create a new task. A *task* is an execution of a sample file or URL in a defined environment (operating system profile + testing plugin script).

Syntax

```
$ curl -X POST -d "sample_id=<sample_id>&env=drd" https://<CA-host>/rapi/tasks

$ curl -X POST -d "sample_id=<sample_id>&env=sbx&tp_IVM.TIMEOUT=30" https://<CA-
host>/rapi/tasks

$ curl -X POST -d "sample_id=<sample_id>&env=ivm&exec_args=c:\windows\wscript.exe
{sample}" https://<CA-host>/rapi/tasks
```

HTTP Return Value

`JSON`

HTTP Parameters

`sample_id`	Sample ID (required)
`storage_classes`	How the event data will be stored. 1 Local database 2 Local fileshare 4 Local fileshare as GZIP 8 Amazon S3 cloud storage 16 Amazon S3 cloud storage as GZIP
`env={sbx|ivm|drd}`	Task environment (required)
`primary_resource_id`	Override default execution resource by ID
`ivm_profile`	Virtual machine profile short name, if **env=ivm** is specified

`exec_args`	Override default execution arguments
`primary_resource_name`	Override default execution resource by name
`priority={high|medium|low}`	Task priority
`tp_<task_property>`	Set multiple task properties
`vmp_id`	Virtual machine profile ID, if **env=ivm** is specified

HTTP URL

`/tasks`

Get Task Statistics

Get statistics for a completed task.

Syntax

```
$ curl -X GET https://<CA-host>/rapi/tasks/<task_id>/stats
```

HTTP Return Value

`JSON`

HTTP URL

`/tasks/(?P<task_id>[09]+)/stats`

Get a Sample's Tasks

Get tasks for a sample.

Syntax

```
$ curl X GET https://<CA-host>/rapi/samples/<sample_id>/tasks
```

HTTP Return Value

`JSON`

HTTP URL

`/samples/(?P<sample_id>[09]+)/tasks`

Get Pattern Group

Get all pattern groups or a specific pattern.

Syntax

```
$ curl -X GET https://<CA-host>//rapi/pattern_groups
```

```
$ curl -X GET https://<CA-host>//rapi/pattern_groups/<group_ID>
```

HTTP Return Value

`JSON`

HTTP Parameters

`include_global`	Include/exclude global patterns. Default: 1 (include).
`owner`	Return only patterns belonging to the specified owner. If owner contains a value, **include_global=0** must also be specified.

HTTP URL

```
/pattern_groups
/pattern_groups/(?P<pattern_group_id>[09]+)
/pattern_groups/(?P<pattern_group_uuid>[af09\](36})
```

Retrieve Sample Tasks

Get tasks for a sample.

Syntax

```
$ curl -X GET https://<CA-host>/rapi/samples/<task_id>/tasks
```

HTTP Return Value

`JSON`

HTTP URL

```
/samples/(?P<sample_id>[09]+)/tasks
```

Get Risk Score

Get the risk score of a completed task.

Syntax

```
$ curl -X GET https://<CA-host>/rapi/tasks/<task_id>/risk_score
```

HTTP Return Value

`JSON`

HTTP Parameters

`owner`	override sample owner for risk calculation

HTTP URL

```
/tasks/(?P<task_id>[09]+)/risk_score
```

Retrieve Matched Patterns

Get pattern group results for a completed task.

Syntax

```
$ curl -X GET https://<CA-host>/rapi/tasks/<task_id>/patterns
```

HTTP Return Value

`JSON`

HTTP URL

```
/tasks/(?P<task_id>[09]+)/patterns
```

Retrieve Task Events

Get event data for a completed task.

Syntax

```
$ curl -X GET https://<CA-host>//rapi/tasks/<task_id>/events
```

```
$ curl -X GET https://<CA-host>//rapi/tasks/<task_id>/events?mode=gpb&include_
norm_stats=1
```

HTTP Return Value

`[JSON|GPB]`

HTTP Parameters

`include_ norm_stats`	Include/exclude normalization statistics. Default: 0 (exclude)
`event_filter`	Return only certain event types (not implemented)
`mode= {json|gpb}`	Return events as JSON or Google Protocol Buffer. Default: json

HTTP URL

```
/tasks/(?P<task_id>[09]+)/events
```

Retrieve Task Resources

Get resources for a completed task.

Syntax

```
$ curl -X GET https://<CA-host>/rapi/tasks/<task_id>/resources
```

HTTP Return Value

`JSON`

HTTP URL

```
/tasks/(?P<task_id>[09]+)/resources
```

Retrieve Sample Binary File

Get sample resource binary.

Syntax

```
$ curl -X GET https://<CA-host>/rapi/samples/resources/<resource_id>/bin
```

HTTP Return Value

`binary`

HTTP URL

```
/samples/resources/(?P<resource_id>[09]+)/bin
```

Search for a Sample

Search for a basic sample.

Syntax

```
$ curl -X GET https://<CA-host>/rapi/samples/basic/<sample_id>

$ curl -X GET https://<CA-host>/rapi/samples/basic?owner=admin

$ curl -X GET https://<CA-host>/rapi/samples/basic?owner=admin&limit=2&offset=10
```

HTTP Return Value

`JSON`

HTTP Parameters

`sha256`	Search by SHA256
`exact`	If exact=**0** then allow partial string matches. Default: 0
`md5`	Search by MD5
`owner`	Search by owner
`lable`	Search by label
`offset`	Combine with **limit** to page through results. Default: 0
`limit`	Limit number of results. Default: 100
`resource_magic`	Search by sample resource magic string
`resource_name`	Search by sample resource name

HTTP URL

```
/samples/basic
/samples/basic/(?P<sample_id>[09]+)
```

Search Tasks

Search for tasks by query string.

> **Note:** Only tasks that were created in versions 2.4.1 and later can be searched using this function.

You can get faster results when searching on some fields by using these RAPI endpoints:

- "Search by Task Field" on page 21 – Search by one field and its value.
- "Search for Tasks by Sample" on page 24 – Search by the MD5 or SHA256 value of the sample.
- "Search for Task Reports" on page 23 – Search by report ID.

Syntax

```
$ curl -X GET "https://<CA-host>/rapi/search?<parameters>"
```

HTTP Return Value

`JSON`

HTTP Parameters

`q`	Query string using Lucene query syntax. Consult Search Malware Analysis Tasks in the *Content Analysis WebGuide* on **Broadcom Tech Docs** to see how to form the queries. Use an asterisk (`*`) to match all reports. The default operator is `AND`.
`full_source [0|1]`	Include a summary of important task events in the results. Default: 0 (summary not included)
`order_by` *`<field1>,<field2>`*	One or more comma-separated fields to sort the results by. Default order is ascending; to change to descending add `:desc` to the field name. Default: `task_start:desc` (order the results by the task-start time, in descending order)
`date_lt [`*`<epoch>`*`|`*`<date>`*`]`	Upper limit for a date search. Combine with `date_gte` (lower limit) for a date range. Use Unix epoch, ISO 8601, or Elasticsearch date math (https://www.elastic.co/guide/en/elasticsearch/reference/current/common-options.html#date-math). Omit this parameter to default to the current time.
`date_gte [`*`<epoch>`*`|`*`<date>`*`]`	Lower limit for a date search. Combine with `date_lt` (upper limit) for a date range. Default: 0 (1 Jan 1970 or later)
`owner`	Filter results by the sample owner. Omit this parameter to see results from all owners to which the API token permits access.
`count`	Limit the number of results to this integer. Default: 10 (next 10 results in the current sort order)
`from`	Combine with `count` to page through the results. Default: 0 (start from the first sorted result)
`search_after [`*`<epoch>`*`|`*`<date>`*`]`	Page through the results by specifying the sort values of the last hit in a previous search. Omit this parameter to get results according to `count` and `from`.
`scroll` *`<time_unit>`*	How long to keep a scrollable search context alive. Use Elasticsearch time units. (https://www.elastic.co/guide/en/elasticsearch/reference/5.5/common-options.html#time-units=) Default: None (do not return a scrollable search context)
`remote [0|1]`	Search a remote search host instead of the local host. Default: 0 (search the local host)

Examples

Find **`d41d8cd98f00b204e9800998ecf8427e`** in any field:

```
$ curl -X GET "https://203.0.113.17:8082/rapi/search/?q=d41d8cd98f00b204e9800998ecf8427e"
```

Search for structured reports from January 1, 2020 with risk score greater than 6:

```
$ curl -X GET "https://203.0.113.17:8082/rapi/search?q=risk_score:>6&owner=admin&date_lt:2020-01-
02&date_gte:2020-01-01"
```

Search for structured reports that have events with `foo` or `bar` in the file path. Order results by risk score in descending order and include the event summary:

```
$ curl -X GET "https://203.0.113.17:8082/rapi/search?q=fs_paths:foo%20OR%20fs_path:bar&order_by=risk_
score:desc&full_source=1"
```

Search for structured reports that have events with **foo** in the file path and **bar** as the top-level domain. Return 1337 results and include the event summary:

```
$ curl -X GET "https://203.0.113.17:8082/rapi/search?q=fs_paths:foo%20AND%20tlds:bar&count=1337&full_
source=1"
```

Search for structured reports where the sample is owned by user **bar**. Include the event summary. Order first by timestamp in ascending order, then by task ULID in ascending order, and return 10 results after the result that has timestamp with value **1507893203000** and task ULID with value **05FHAW33NQ8K3HFTMDR5C1FB8G**:

```
$ curl -X GET "https://203.0.113.17:8082/rapi/search?owner=bar&full_source=1&count=10&order_
by=timestamp,id&search_after=[1507893203000,"05FHAW33NQ8K3HFTMDR5C1FB8G"]"
```

Search for structured reports where the sample is owned by user **bar**. Include the event summary. Return 1000 results sorted in the fastest possible order and create a scrollable search context that will stay alive for another 5 minutes.

```
$ curl -X GET "https://203.0.113.17:8082/rapi/search?owner=bar&full_source=1&count=1000&order_by=_
doc&scroll=5m"
```

HTTP URL

`/search`

Search by Task Field

Search for tasks using the specified field. This method returns results faster than specifying a single field in **/search**.

> **Note:** Only tasks that were created in versions 2.4.1 and later can be searched using this function.

Syntax

```
$ curl -X GET "https://<CA-
host>/rapi/search/field?fn=<field>&fv=<value>&<parameters>"
```

HTTP Return Value

`JSON`

HTTP Parameters

fn	Field name to match. Required.
fv	Field value to match. Required.
wildcard [0|1]	Allow wildcards in **fv**. Default: 1 (wildcards ? and * are allowed)
fuzzy [0|1]	Do fuzzy matching. Default: 0 (no fuzzy matching)
full_source [0|1]	Include a summary of important task events in the results. Default: 0 (summary not included)

`order_by <field1>,<field2>`	One or more comma-separated fields to sort the results by. Default order is ascending; to change to descending add **`:desc`** to the field name. Default: **`task_start:desc`** (order the results by the task-start time, in descending order)
`date_lt [<epoch>|<date>]`	Upper limit for a date search. Combine with **`date_gte`** (lower limit) for a date range. Use Unix epoch, ISO 8601, or Elasticsearch date math (https://www.elastic.co/guide/en/elasticsearch/reference/current/common-options.html#date-math). Omit this parameter to default to the current time.
`date_gte [<epoch>|<date>]`	Lower limit for a date search. Combine with **`date_lt`** (upper limit) for a date range. Default: 0 (1 Jan 1970 or later)
`owner`	Filter results by the sample owner. Omit this parameter to see all owners that the API token permits access to.
`count`	Limit the number of results to this integer. Default: 10 (next 10 results in the current sort order)
`from`	Combine with **`count`** to page through the results. Default: 0 (start from the first sorted result)
`search_after [<epoch>|<date>]`	Page through the results by specifying the sort values of the last hit in a previous search. Omit this parameter to get results according to **`count`** and **`from`**.
`scroll <time_unit>`	How long to keep a scrollable search context alive. Use Elasticsearch time units. (https://www.elastic.co/guide/en/elasticsearch/reference/5.5/common-options.html#time-units=) Default: None (do not return a scrollable search context)
`remote [0|1]`	Search a remote search host instead of the local host. Default: 0 (search the local host)

Examples

Search for structured reports where the MD5 hash of the sample is **`d41d8cd98f00b204e9800998ecf8427e`**:

```
$ curl -X GET "https://203.0.113.17:8082/rapi/search/field?fn=md5&fv=d41d8cd98f00b204e9800998ecf8427e"
```

Search for structured reports where the sample label fuzzy matches **`boofar`** and the sample owner is **`foo`**:

```
$ curl -X GET "https://203.0.113.17:8082/rapi/search/field?fn=label&fv=boofar&owner=foo&fuzzy=1"
```

Search for structured reports where the risk score is 7 and the owner is **`foo`**; include the event summary:

```
$ curl -X GET "https://203.0.113.17:8082/rapi/search/field?fn=risk_score&fv=7&owner=foo&full_source=1"
```

HTTP URL

```
/search/field
```

Search for Task Reports

Search for or delete task reports, using the report ID. This method returns results faster than specifying the `id` or `task_local_ulid` in `/search`.

> **Note:** Only tasks that were created in versions 2.4.1 and later can be searched using this function.

Syntax

```
$ curl -X GET https://<CA-host>/rapi/search/report/[<task_local_id>|<task_ulid>]?<parameters>
```

```
$ curl -X DELETE https://<CA-host>/rapi/search/report/[<task_local_id>|<task_ulid>]?<parameters>
```

HTTP Return Value

`JSON`

HTTP Parameters

`owner`	Filter results by the sample owner. Omit this parameter to see all owners that the API token permits access to.
`remote [0|1]`	Search a remote search host instead of the local host. Default: 0 (search the local host)

Example

Get the structured report with a task ULID of **`05FHAW33NQ8K3HFTMDR5C1FB8G`**:

```
$ curl -X GET "https://203.0.113.17:8082/rapi/search/report/05FHAW33NQ8K3HFTMDR5C1FB8G"
```

Get the structured report with a local task ID of **`1337`**:

```
$ curl -X GET "https://203.0.113.17:8082/rapi/search/report/1337"
```

Get the structured report with a local task ID of **`1337`**, but only if the owner is **`foo`**:

```
$ curl -X GET "https://203.0.113.17:8082/rapi/search/report/1337?owner=foo"
```

Delete the structured report with a local task ID of **`1337`**, but only if the owner is **`bar`**:

```
$ curl -X DELETE "https://203.0.113.17:8082/rapi/search/report/1337?owner=bar"
```

HTTP URL

```
/search/report/[<task_local_id>|<task_ulid>]
```

Search for Tasks by Sample

Search for tasks that are associated with a sample, using the MD5 or SHA256 hash. This method returns results faster than specifying the hash field in **`/search`**. Partial hash searches are not permitted.

> **Note:** Only tasks that were created in versions 2.4.1 and later can be searched using this function.

Syntax

```
$ curl -X GET "https://<CA-host>/rapi/search/sample/[md5|sha256]/<hash>"
```

HTTP Return Value

`JSON`

HTTP Parameters

`full_source [0|1]`	Include a summary of important task events in the results. Default: 0 (summary not included).
`order_by <field1>,<field2>`	One or more comma-separated fields to sort the results by. Default order is ascending; to change to descending add **`:desc`** to the field name. Default: **`task_start:desc`** (order the results by the task-start time, in descending order)
`date_lt [<epoch>|<date>]`	Upper limit for a date search. Combine with **`date_gte`** (lower limit) for a date range. Use Unix epoch, ISO 8601, or Elasticsearch date math (https://www.elastic.co/guide/en/elasticsearch/reference/current/common-options.html#date-math). Omit this parameter to default to the current time.
`date_gte [<epoch>|<date>]`	Lower limit for a date search. Combine with **`date_lt`** (upper limit) for a date range. Default: 0 (1 Jan 1970 or later)
`owner`	Filter results by the sample owner. Omit this parameter to see all owners that the API token permits access to.
`count`	Limit the number of results to this integer. Default: 10 (next 10 results in the current sort order)
`from`	Combine with **`count`** to page through the results. Default: 0 (start from the first sorted result)
`search_after [<epoch>|<date>]`	Page through the results by specifying the sort values of the last hit in a previous search. Omit this parameter to get results according to **`count`** and **`from`**.
`scroll <time_unit>`	How long to keep a scrollable search context alive. Use Elasticsearch time units. (https://www.elastic.co/guide/en/elasticsearch/reference/5.5/common-options.html#time-units=) Default: None (do not return a scrollable search context)
`remote [0|1]`	Search a remote search host instead of the local host. Default: 0 (search the local host)

Examples

Search for structured reports where the MD5 hash of the sample is **`d41d8cd98f00b204e9800998ecf8427e`**:

```
$ curl -X GET "https://203.0.113.17:8082/rapi/search/sample/md5/d41d8cd98f00b204e9800998ecf8427e"
```

Search for structured reports from January 1, 2020 where the MD5 hash of the sample is **d41d8cd98f00b204e9800998ecf8427e** and the sample owner is **foo**:

```
$ curl -X GET
"https://203.0.113.17:8082/rapi/search/sample/md5/d41d8cd98f00b204e9800998ecf8427e?owner=foo&date_
lt:2020-01-02&date_gte:2020-01-01"
```

Search for structured reports where the SHA256 hash of the sample is **d41d8cd98f00b204e9800998ecf8427e**, order results by risk score in descending order, and include the event summary:

```
$ curl -X GET
"https://203.0.113.17:8082/rapi/search/sample/sha256/d41d8cd98f00b204e9800998ecf8427e?order_by=risk_
score:desc&full_source=1"
```

HTTP URL

```
/search/sample/[md5|sha256]/<hash>
```

Scroll Through Tasks

Scroll through tasks that are returned by other queries, or delete the search context when finished scrolling.

Syntax

```
$ curl -X GET "https://<CA-host>/rapi/search/scroll?<parameters>"

$ curl -X DELETE "https://<CA-host>/rapi/search/scroll?<parameters>"
```

HTTP Return Value

```
JSON
```

HTTP Parameters

scroll ***<time_unit>***	How long to keep a scrollable search context alive. Use Elastic search time units. (https://www.elastic.co/guide/en/elasticsearch/reference/5.5/common-options.html#time-units=) Default: None (do not return a scrollable search context)
scroll_id	This value is always returned by a previous call to **/search** or **/search/scroll**
remote [0|1]	Search a remote search host instead of the local host. Default: 0 (search the local host)

Examples

Continue scrolling a search context with a **scroll_id** of **ABCD1234** and keep the search context alive for another minute:

```
$ curl -X GET "https://203.0.113.17:8082/rapi/search/scroll?scroll=1m&scroll_id=ABCD1234"
```

Delete the search context with a **scroll_id** of **ABCD1234**:

```
$ curl -X DELETE "https://203.0.113.17:8082/rapi/search/scroll?scroll_id=ABCD1234"
```

HTTP URL

`/search/scroll`

Aggregate Search Task Results

Do a query string search and aggregate the results.

Syntax

```
$ curl -X GET "https://<CA-host>/rapi/search/aggs?<parameters>"
```

HTTP Return Value

`JSON`

HTTP Parameters

`q`	Query string using Lucene query syntax. Consult Search Malware Analysis Tasks in the *Content Analysis WebGuide* on **Broadcom Tech Docs** to see how to form the queries. Use an asterisk (`*`) to match all reports.
`buckets`	How to group reports into buckets. Supported values are **`date_histogram`**, **`histogram`**, **`missing`**, **`significant_terms`**, and **`terms`** Format is `<user-selected_name>:<aggregation_type>:<field>:[<interval>|<bucket_size>]` Default: **`top_10_sample_sha256:terms:sha256:10`** (return an aggregation named **`top_10_sample_ sha256`** that contains the top 10 sha256 samples) Chain or nest multiple buckets together using comma separation. Field-name aliases are supported. Max. number of buckets: 4 Max. bucket size: 10 000 (If the specified interval would create a bucket size larger than 10 000, the interval will be adjusted to have a size of 9999 or less.)
`metrics`	Which metrics to get from the buckets. Supported values are **`avg`**, **`cardinality`**, **`max`**, **`min`**, **`percentiles`**, **`stats`**, **`sum`** and **`value_count`** Format is `<user-selected_name>:<metric_type>:<field>:[<interval>:<bucket_size>]` Default: **`avg_risk_score:avg:risk_score`** (return a metric named **`avg_risk_score`** with the average risk score for each bucket in the aggregation) Use multiple metrics with comma separation. Field-name aliases are supported.
`full_source [0|1]`	Include a summary of important task events in the results. Default: 0 (summary not included)
`order_by` ***`<field1>,<field2>`***	One or more comma-separated fields to sort the results by. Default order is ascending; to change to descending add **`:desc`** to the field name. Default: **`task_start:desc`** (order the results by the task-start time, in descending order)

`date_lt [<epoch>|<date>]`	Upper limit for a date search. Combine with `date_gte` (lower limit) for a date range. Use Unix epoch or Elastic search date math (https://www.elastic.co/guide/en/elasticsearch/reference/current/common-options.html#date-math). Omit this parameter to default to the current time.
`date_gte [<epoch>|<date>]`	Lower limit for a date search. Combine with `date_lt` (upper limit) for a date range. Default: 0 (1 Jan 1970 or later)
`owner`	Filter results by the sample owner. Omit this parameter to see all owners that the API token permits access to.
`count`	Limit the number of results to this integer. Default: 0 (no search results; only return the aggregated results)
`from`	Combine with `count` to page through the results. Default: 0 (start from the first sorted result)
`search_after [<epoch>|<date>]`	Page through the results by specifying the sort values of the last hit in a previous search. Omit this parameter to get results according to `count` and `from`.
`scroll <time_unit>`	How long to keep a scrollable search context alive. Use Elastic search time units. (https://www.elastic.co/guide/en/elasticsearch/reference/5.5/common-options.html#time-units=) Default: None (do not return a scrollable search context)
`remote [0|1]`	Search a remote search host instead of the local host. Default: 0 (search the local host)

Examples

Search for structured reports where any field matches **d41d8cd98f00b204e9800998ecf8427e** and return the average risk score of each of the 10 most occurring samples:

```
$ curl -X GET "https://203.0.113.17:8082/rapi/search/aggs?q=d41d8cd98f00b204e9800998ecf8427e"
```

Search for structured reports from January 1, 2020 with a risk score higher than 6 and the owner named **foo**, and return the average risk score of each of the 10 most occurring samples:

```
$ curl -X GET "https://203.0.113.17:8082/rapi/search/aggs?q=risk_score:>6&owner=foo&date_lt:2020-01-
02&date_gte:2020-01-01"
```

Match any structured report and return the average risk score of each of the 10 most occurring samples in each month:

```
$ curl -X GET "https://ca_host:8082/rapi/search/aggs?buckets=histogram:date_
histogram:timestamp:month,top_10_sample_sha256:terms:sha256:10"
```

Get Task Results Schema

Return the task-results schema, with descriptions, in JSON format.

Syntax

```
$ curl -X GET "https://<CA-host>/rapi/search/schema"
```

HTTP Return Value

JSON

HTTP Parameters

`remote [0|1]`	Search a remote search host instead of the local host. Default: 0 (search the local host)

Example

```
$ curl -X GET "https://203.0.113.17:8082/rapi/search/schema"
```

Delete Task

Deletes a task. All events and task resources are also deleted.

Syntax

```
$ curl -X DELETE https://<CA-host>/rapi/tasks/<task_id>
```

HTTP Return Value

`JSON`

HTTP URL

```
/tasks/(?P<task_id>[09]+)
```

Delete Sample

Delete a sample. This deletes the sample record, all attached task records, task events, task resources, and sample resources. Sample resources records will not be deleted if another sample also shares the sample resource. Sample resource binaries will be deleted and the resource flag set to False.

Syntax

```
$ curl -X DELETE https://<CA-host>/rapi/samples/<sample_id>
```

HTTP Return Value

`JSON`

HTTP URL

```
/samples/(?P<sample_id>[09]+)
```

Fetch VirusTotal Data

VirusTotal is a free virus, malware, and URL online scanning service.

Syntax

```
$ curl -X GET https://<CA-host>/rapi/3rdparty/vt/<file_md5>
```

where **<file_md5>** is the MD5 hash of the file. For example:

```
$ curl -X GET https://<CA-host>/rapi/3rdparty/vt/6600aaf7babed63bca0fa860ff0f69ff
```

HTTP Return Value

```
JSON
```

HTTP URL

```
/3rdparty/vt/(?P<md5>[afAF09]{32})
```

Get Status of Queues

Get status of files in the queue waiting for the on-box sandbox to analyze.

Syntax

```
$ curl -X GET https://<CA-host>/rapi/system/queues
```

HTTP Return Value

```
JSON
```

HTTP URL

```
/system/queues
```

Get Health State

Get health state (green/yellow/red) of the Content Analysis appliance.

Syntax

```
$ curl -X GET https://<CA-host>/rapi/system/health
```

HTTP Return Value

```
JSON
health_states = {0: "green", # Full operational 1: "yellow", # Operational, needs maintenance 2: "red"
# Not operational, needs immediately inspection}
```

HTTP URL

```
/system/health
```

Get Database Counts

Get database counts, including sample count, task count, event count, task count grouped by environment, task count grouped by status.

Syntax

```
$ curl -X GET https://<CA-host>/rapi/system/stats/counts
```

HTTP Return Value

`JSON`

HTTP URL

`/system/stats/counts`

List Current Sessions

List all current user sessions. As an alternative to using an API key to authenticate, users can authenticate with their Content Analysis user name and password, which will provide them with a temporary API key (also called a token).

Syntax

```
$ curl -X GET https://<CA-host>/rapi/auth/sessions
```

HTTP Return Value

`JSON`

HTTP URL

`/auth/sessions`

Download Windows Base Image

Download a Windows base image from the specified Content Analysis appliance and place it on a local system.

Syntax

```
$ curl -OJ https://<CA-host>/rapi/system/vm/bases/<vmb_id>/bin

$ curl -k -OJ -H "X-API-TOKEN:<API-key>" https://<CA-
host>:8082/rapi/system/vm/bases/<vmb_id>/bin
```

HTTP Return Value

`Binary`

Example

```
$ curl -k -OJ -H "X-API-TOKEN:7a49af86645e4e3a9f24608636135f64"
https://203.0.113.17:8082/rapi/system/vm/bases/1/bin
```

HTTP URL

```
/system/vm/bases/(?P<vmb_id>[0-9]+)/bin
```

Pull Windows Base Image from URL

Import a Windows base image onto the specified Content Analysis appliance by pulling the file from the specified URL.

Syntax

```
$ curl -k -H "X-API-TOKEN:<API-key>" -d "url=http://web_server/base_
image.bundle" https://<CA-host>/rapi/system/vm/bases/pull?product_key=<key>
```

HTTP Parameters

`api_key`	API key when downloading from Content Analysis (optional)
`product_key`	Microsoft Windows product key for the IVM
`validate_cert`	Validate HTTPS certificate. Default: 1
`retry_failed`	Retry base image download if the name is the same and the state is error. Default: 0
`use_proxy`	Use configured proxy server. Default: 0
`url`	Location of VM bundle (required)
`build_profile`	Build standard profile after downloading image. Default: 1

HTTP Return Value

`JSON`

Example

```
$ curl -k -H "X-API-TOKEN:7a49af86645e4e3a9f24608636135f64" -d "url=http://web_server/base_
image.bundle" https://203.0.113.17:8082/rapi/system/vm/bases/pull?product_key=xxxxx-xxxxx-xxxxx-xxxxx-
xxxxx
```

HTTP URL

```
/system/vm/bases/pull
```

Upload Windows Base Image

Upload a Windows base image to the specified Content Analysis appliance.

Syntax

```
$ curl -F upload=@base_image.bundle https://<CA-
host>/rapi/system/vm/bases/post?product_key=<key>
```

HTTP Parameters

`product_key`	Microsoft Windows product key for the IVM
`file`	Multi-part form-data file attachment
`build_profile`	Build a standard profile after upload. Default: 1

HTTP Return Value

`JSON`

Example

```
$ curl -k -H "X-API-TOKEN:7a49af86645e4e3a9f24608636135f64" -F upload=@base_image.bundle
https://203.0.113.17:8082/rapi/system/vm/bases/post?product_key=xxxxx-xxxxx-xxxxx-xxxxx-xxxxx
```

HTTP URL

`/system/vm/bases/post`

Pull Windows ISO from URL

Install a Windows ISO image on to the specified Content Analysis appliance by pulling it from the specified URL. If you are uploading a multiple-edition ISO, you must also follow the instructions in " Install a Multi-Edition ISO File" on page 34.

Syntax

```
$ curl -H "X-API-TOKEN:<api_key>" -d "url=http://<web_server>/<filename>.iso"
https://<CA-host>/rapi/system/vm/bases/pull_iso?product_key=<key>&iso_type=<type>
```

HTTP Parameters

`product key`	Microsoft Windows product key for the IVM
`display_name`	Display name of the new base image (required)
`validate_cert`	Validate HTTPS certificate. Default=1.
`use_proxy`	Use configured proxy server. Default=0.
`file`	Multi-part form-data file attachment
`iso_type={win7x64|win10x64|winxp-sp3}`	Type of ISO (required)
`build_profile`	Build standard profile after downloading image. Default=1.
`kms_server`	KMS server to use for activation, if not using the product key.

`ntp_server`	NTP server, required if **kms_server** is set.

HTTP Return Value

`JSON`

Example

```
$ curl -k -H "X-API-TOKEN:7a49af86645e4e3a9f24608636135f64" -d "url=http://web_server/windows.iso"
https://203.0.113.17:8082/rapi/system/vm/bases/pull_iso?product_key=xxxxx-xxxxx-xxxxx-xxxxx-xxxxx&iso_
type=win10x64
```

HTTP URL

`/system/vm/bases/pull_iso`

Upload Windows ISO File

Upload and install a Windows ISO image to the specified Content Analysis appliance. If you are installing a multiple-edition ISO, you must also follow the steps in " Install a Multi-Edition ISO File" on the next page.

> **Note:** This method does not support Windows XP ISOs. Use "Pull Windows ISO from URL" on the previous page instead.

Syntax

```
$ curl -F file=@<filename>.iso -H "X-API-TOKEN:<token>" https://<CA-
host>/rapi/system/vm/bases/post_iso?product_key=<key>&iso_type=<type>
```

HTTP Parameters

`url`	Location of the ISO image (required)
`display_name`	Display name of the new base image (required)
`iso_type=[win7x64|win10x64]`	Type of ISO (required)
`product_key`	Microsoft Windows product key for the IVM, if not using a KMS server. Use the product key for the version and edition that you want to install.
`file`	Multi-part form-data file attachment
`build_profile`	Build a standard profile after upload. Default: 1
`validate_cert`	Validate the HTTP certificate. Default: 1
`kms_server`	KMS server to user for activation (if not using product key)
`ntp_server`	NTP server, required only if **kms_server** is set.

`use_proxy`	Use the global proxy settings. Default: 0

HTTP Return Value

`JSON`

Example

```
$ curl -k -H "X-API-TOKEN: 3b6d132a0d6b44409693d55d77137a8c" -d "roles=administrator&user=admin"
"https://203.0.113.17:8082/rapi/system/vm/bases/post_iso?build_profile=1&product_key=xxxxx-xxxxx-
xxxxx-xxxxx-xxxxx&name=win7x64_post&display_name=win7x64_post&iso_type=win7x64" -F file=@WIN7-x17.iso
```

HTTP URL

```
/system/vm/bases/post_iso
```

Install a Multi-Edition ISO File

Install a Windows base image from a multiple-edition Windows ISO onto the specified Content Analysis appliance. A multi-edition ISO contains more than one edition of a Windows version, for example, Windows 7 Home Basic or Windows 10 Professional. You must follow these steps to install an image from a multi-edition ISO:

1. "Pull Windows ISO from URL" on page 32 or "Upload Windows ISO File" on the previous page.
2. Run GET **/rapi/system/vm/bases/<vmb_id>/iso_selection** to obtain the edition's index number.
3. Run POST **/rapi/system/vm/bases/<vmb_id>/iso_selection** to include **version_index** and the product key or KMS server, which will install the image.

Syntax

```
$ curl -k -H "X-API-TOKEN:<API-key>" -d "roles=<role>&user=<username>" https://<CA-
host>/rapi/system/vm/bases/(<vmb_id>)/iso_selection[&product_key=<key>&version_
index=<ID>]
```

HTTP POST Parameters

`version_index`	Index number of the Windows edition; obtain by running **GET /rapi/system/vm/bases/<vmb_id>/iso_selection**. (Required)
`vmb_id`	Integer that represents the base image that was installed in step 1. Returned as **vm_bases_vmb_id**.
`product_key`	Microsoft Windows product key for the ISO, if not using the KMS server. Use the product key for the version and edition that you want to install.
`kms_server`	KMS server to use for activation, if not using the product key.
`ntp_server`	NTP server, required if **kms_server** is set.
`queue_if_busy`	Queue the operation if the controller is busy. Default: 0

HTTP GET Return Value

```
{
      "api_version": 9,
      "exec_time": 0.0057,
      "request": "GET /system/vm/bases/xx/iso_selection",
      "results": [
            {
                  "index": "<integer>",
                  "name": "Windows <version> <edition_name>"
            },
            {
                  "index": "<integer>",
                  "name": "Windows <version> <edition_name>"
            },
            {
                  "index": "<integer>",
                  "name": "Windows <version> <edition_name>"
            },
            {
                  "index": "<integer>",
                  "name": "Windows <version> <edition_name>"
            }
      ],
      "results_count": 4,
      "server_time": "2019-08-28T10:07:02.652755"
}
```

Example

Obtain the edition's index number:

```
$ curl -k -H GET "X-API-TOKEN:aaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaa" -d
"roles=administrator&user=isoloader" https://203.0.113.17:8082/rapi/system/vm/bases/1/iso_selection
```

Install the edition:

```
$ curl -X POST -H "X-API-TOKEN:aaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaa" -d
"roles=administrator&user=isoloader" https://203.0.113.17:8082/rapi/system/vm/bases/1/iso_
selection&product_key=xxxxx-xxxxx-xxxxx-xxxxx-xxxxx&version_index=2
```

HTTP URL

```
/system/vm/bases/<vmb_id>/iso_selection
```

Export iVM Profile

Export an iVM profile or modify an already exported profile's metadata.

Syntax

```
$ curl -X POST -d \"vmp_id=1\" https://<CA-host>/rapi/system/vm/profiles/export
```

```
$ curl -X POST -d \"description=new description\" https://<CA-
host>/rapi/system/vm/profiles/export/05E9QMMKF8ANPGZNG7DJY9D4DR
```

HTTP Return Value

`JSON`

HTTP Parameters

`queue_if_busy`	Queue the operation if controller is busy. Default: 0 (off)
`short_name`	Abbreviated name of the exported profile
`vmp_id`	Virtual machine profile ID to export (only if **vme_id** is not specified)
`compression={none|gzip|lzma}`	Optional compression to use. Default: none
`name`	Name of the exported profile
`description`	Description of the exported profile
`ttl`	Number of hours the exported profile should be kept on disk. Default: 24. Enter **0** to keep forever.

HTTP URL

```
/system/vm/profiles/export
/system/vm/profiles/export/(?P<vme_id>[0-9A-HJKMNPQRSTVWXYZ]{26})
```

Get Exported IVM Profile Metadata

Get exported IVM profile metadata.

Syntax

```
$ curl -X GET https://<CA-
host>/rapi/system/vm/profiles/export/05E9QMMKF8ANPGZNG7DJY9D4DR
```

HTTP Return Value

`JSON`

HTTP Parameters

`vme_id`	Exported IVM profile ID (optional)

HTTP URL

```
/system/vm/profiles/export
/system/vm/profiles/export/(?P<vme_id>[0-9A-HJKMNPQRSTVWXYZ]{26})
```

Download Exported iVM Profile

Download an exported iVM profile to the specified CA appliance.

Syntax

```
$ curl -X GET https://<CA-
host>/rapi/system/vm/profiles/export/05E9QMMKF8ANPGZNG7DJY9D4DR/bin
```

HTTP Return Value

```
Binary
```

HTTP URL

```
/system/vm/profiles/export/(?P<vme_id>[0-9A-HJKMNPQRSTVWXYZ]{26})/bin
```

Import IVM Profile

Import an exported IVM profile.

Syntax

```
$ curl -X POST -F upload=@profile.qcow2.bundle https://<CA-
host>/rapi/system/vm/profiles/import
```

HTTP Return Value

```
JSON
```

HTTP Parameters

`short_name`	Abbreviated name to use for the new profile (default from the bundle)
`file`	Multi-part form-data file attachment
`name`	Name to use for the new profile (default from the bundle)
`set_default`	Set the profile as the default profile
`build_profile`	Build the profile after import. Default: 1 (yes)
`overwrite`	Overwrite the profile if it already exists. Default: 0 (off)
`description`	Description of the exported profile

HTTP URL

```
/system/vm/profiles/import
```

Pub-Sub API for Notifications

The Publish-Subscribe Application Programming Interface (Pub-Sub API) allows for the immediate and secure notification of tasks in progress, tasks that have been completed, and scanning verdicts. This functionality allows for the automation of additional post-processing outside of Content Analysis, the initiation of downstream processes in other systems, and for the assignment of targeted actions to be taken by analysts or security practitioners.

WebSocket is a web technology providing full-duplex communications channels over a single TCP connection. WebSocket differs from TCP in that it enables a stream of messages instead of a stream of bytes. The communications are done over TCP port numbers 8081 and 8082, which is of benefit for those environments that block non-standard Internet connections using a firewall.

The WebSocket implementation provides for secure communications between clients and servers over the web. It features an HTTP-compatible handshake so that HTTP servers can share their default HTTP and HTTPS ports with a WebSocket gateway or server.

The WebSocket protocol uses **ws://** and **wss://** prefixes to indicate standard WebSocket and WebSocket Secure connections, respectively. Symantec strongly advises its customers to utilize WebSocket Secure **wss://**.

Pass API Keys to the Pub-Sub API

The Pub-Sub API accepts API keys for user security authentication. (See "Generate an API Key" on page 6.) This simple example in Python demonstrates how to connect and authenticate with the Pub-Sub API:

```
from websocket import create_connection
addr ="wss://<CA-Host>:8082/rapi/ws/task_state"
ws = create_connection(addr, header={'X-API-TOKEN':<api-key>})
while processing_tasks:
  print ws.recv()
```

WebSockets and Commands

The "task_complete" on the facing page and "task_state" on the facing page WebSockets accept JSON-formatted commands that identify which tasks the client wishes to receive notifications for.

Supported commands and formats include:

`{"command":"add_task", "args":"*"}`	Receive notifications for all tasks
`{"command":"add_task", "args":<task_id>}`	Receive notifications for the specified task
`{"command":"add_task", "args":[<task_id>, <task_id>]}`	Receive notifications for all tasks in the list
`{"command":"clear_tasks", "args":None}`	Clear all tasks from the list

task_complete

The **task_complete** WebSocket retrieves notifications when tasks are complete. This WebSocket provides two URL endpoints:

```
ws[s]://<CA-host>/rapi/ws/task_complete/*
```

Connections to this endpoint will receive task_ complete notifications for all tasks processed by the system. However, if authentication is enabled, only users with privileges to view all tasks can connect to this endpoint.

```
ws[s]://<CA-host>/rapi/ws/task_complete
```

Connections to this endpoint require additional commands, in the format shown above, to indicate which tasks the user wishes to receive notifications for. If authentication is enabled, users can receive only notifications for tasks that they have permission to view.

This WebSocket will not provide notifications for failed tasks. The "task_state" below WebSocket should be used to receive notifications of any tasks that enter an error state.

task_state

The **task_state** WebSocket is used to receive notifications when a task changes state. This WebSocket provides two different URL endpoints: **ws[s]://<CA-host>/rapi/ws/task_state/*** Connections to this endpoint will receive **task_state** change notifications for all tasks processed by the system. However, if authentication is enabled, only users with privileges to view all tasks can connect to this endpoint.

```
ws[s]://<CA-host>/rapi/ws/task_state
```

Connections to this endpoint require additional commands, in the format detailed above, to indicate which tasks the client wishes to receive notifications for. If authentication is enabled, the client can only receive notifications for tasks that it has privileges to view.

Example

The notifications are JSON-formatted text and include only the task ID and state value, as shown in the following example:

```
'{"new_state": 2, "task_id": 443}'
```

A list of all valid **task_state** values can be found in "Task States" below.

Task States

The table below lists valid task states for on-box sandboxing.

Task State	Description	API task_state ID
`CORE_UNINITIALIZED`	Task is uninitialized	Task_State = 0
`CORE_INITIALIZED`	Task is initialized	Task_State = 1
`CORE_INTASKQUEUE`	Task is queued	Task_State = 2
`CORE_POSTPROCESSING`	Task event processing	Task_State = 3

Task State	Description	API task_state ID
`CORE_ININSERTQUEUE`	Task events are awaiting insert	Task_State = 4
`CORE_ERROR`	Generic error	Task_State = 5
`CORE_COMPLETE`	Task complete	Task_State = 6
`CORE_PROCESSING_INSERT`	Inserting events in database	Task_State = 7
`CORE_INSERT_ERROR`	Error inserting events in database	Task_State = 8
`SBX_INPROCESS`	Processing task in SandBox or MobileVM	Task_State = 100
`SBX_COMPLETE`	SandBox or MobileVM task is complete	Task_State = 101
`SBX_ERROR`	Error while processing in SandBox or MobileVM	Task_State = 102
`IVM_INPROCESS`	Processing task in IntelliVM	Task_State = 200
`IVM_COMPLETE`	IntelliVM task is complete	Task_State = 201
`IVM_ERROR`	Error while processing in IntelliVM	Task_State = 202
`APPLE_INPROCESS`	Processing task in Apple Analyzer	Task_State = 300
`APPLE_COMPLETE`	Apple Analyzer task is complete	Task_State = 301
`APPLE_ERROR`	Error while processing in Apple Analyzer	Task_State = 302

syslog

The syslog WebSocket receives notifications for all syslog entries that are emitted by the system's malware analysis components.

```
ws[s]://<CA-host>/rapi/ws/syslog[?loglevel=<value>]
```

The optional **loglevel** parameter indicates the level of messages that will be received, as defined below:

```
_log_levels = {
     'ERR': 3,
     'WARNING': 4,
     'INFO': 6,
     'DEBUG': 7
}
```

If **loglevel** is omitted, this value defaults to the config value set for **bootstrap.loglevel**.

Example

```
{"source": "stats", "message": "Starting stats update", "level": 7, "ts": "2019-12-
10T02:37:40.011019", "server": "mag2"}
```

health

This WebSocket receives notifications about the Content Analysis system health status.

```
ws[s]://<CA-host>/rapi/ws/health
```

A message is published for each health check, indicating the reason for the check and the current health state (**0**=green, **1**=yellow, **2**=red).

Examples

```
{"last_state": 0, "msg_type": "state_unaltered", "state": 0, "source": "df_health", "reason": "df_
health_daemon_not_running", "time": 1418178554}
{"last_state": 2, "msg_type": "state_unaltered", "state": 2, "source": "license", "reason": "license_
validity", "time": 1418178886}
```

Sample Use Cases for Pub-Sub API

The Pub-Sub API facilitates many productive use cases for both end users and integrators, including post-processing and conditional processing of task results. Some common examples are described below. Notification via the Pub-Sub API makes it possible to automate processing as soon as the desired results become available.

Resubmit Dropped Files

Malware often proceeds along a multi-stage infection cycle, where an initial file drops additional files during its run. These additional files may be of interest to the analyst, who can gather up these resources and resubmit them for automated analysis in Content Analysis.

In the API, use the **<task_id>** to request **task_resources**. Request each task resource, iterate through the list to identify resources of interest, download to a local file system, and then submit the desired files normally. Task resources may include screen shots, PCAPs, dropped files, and files the plugin itself creates.

Syntax

To fetch a list of task-resource IDs for the specified task:

```
GET /rapi/tasks/<task_id>/resources
```

To download a binary file for the specified resource:

```
GET /rapi/resources/<resource_id>
```

Download PCAP for Network Traffic Analysis

Download the PCAP file in the same manner as above for the **task_resource**. The line in the resource list that specifies the PCAP is:

```
"resource_magic_magic": "bin:pcap"
```

You can open the PCAP in Security Analytics (which has a Wireshark-like feature) for detailed analysis and artifact extraction or you can use an intrusion detection system (IDS) such as Snort or Suricata to identify network anomalies.

Conditional Processing

Conditional processing is often performed based on the particular results contained within a specific task.

When connected to the **task_complete** WebSocket, a Content Analysis user will receive all task meta-data, including risk score, when the task completes. Alternatively, the user can retrieve a task directly via the API as follows:

```
GET /rapi/tasks/<task_id>
```

Performing contingent actions programmatically based on the sample's **risk_score** is a common function. Content Analysis maintains two separate `risk_score` values:

`tasks_global_risk_score: 8`	Risk score based on default patterns
`tasks_owner_risk_score: 0`	Risk score based on user's custom patterns

Example

For `risk_score >=7`, write the `task_id` to a log file for additional follow-up analysis.

REST API for File Submission

Symantec provides a REST API for submitting individual files to Content Analysis for evaluation using the current configuration. The API is available to people or programs that want to know how Content Analysis would evaluate a file but don’t want to translate it into ICAP, the web-centric protocol that Content Analysis uses. Examples of how the API can be used:

- Use the API with an email gateway to evaluate file attachments.
- Create a script running on a file server to periodically check for malicious files.
- Create a program that submits individual files so that an analyst can see if they are malicious or contain viruses.

Caution: This version of the REST API is considered to be phase 1 and is a limited submission API.

To deliver the scanning verdicts to the client, the Pub-Sub API is used. The API is asynchronous and uses WebSocket protocol, which provides full-duplex communication channels over a single TCP connection. The following four-step use case describes how to generate an API key, subscribe to the WebSocket, select the IVM profile to use, and submit files for evaluation.

Note: Sample Python scripts are attached to this PDF. To open the script, double-click the script filename in the Attachments pane on the left.

Download sample Python scripts in the *Content Analysis WebGuide* on **Broadcom Tech Docs** on the *REST API for File Submission* page.

Step 1: Generate an API Key

The first step to using the REST API for file submission is to generate a key for authenticating to the API. See "Generate an API Key" on page 6 for details.

Other CLI commands are available to view and delete API keys:

- `ma-actions api-key list` Shows the ID for each API key and its associated privileges. Note that it does NOT show the value of the key.
- `ma-actions api-key delete <id>` Deletes the API key with the specified ID.

Step 2: Subscribe to the WebSocket

An API key allows access to the file submission endpoint and to the WebSocket used for results. It is recommended that you subscribe to the results WebSocket before submitting files so that you don't miss responses. Results for all files submitted via the file submission endpoint are sent to the WebSocket. Each request has a server-generated ID and may contain a client-provided identifier to aid in matching the responses to the appropriate requests.

The URL for the WebSocket is `wss://<CA-host>:<port>/rapi/ws/cas_task`, where **<CA-host>** is the host name or IP address of Content Analysis and **<port>** is the web management HTTPS port. If Content Analysis is configured to use HTTP for web management, you can use **ws://...** instead of **wss:/...**, provided that you specify the HTTP port instead of the HTTPS port.

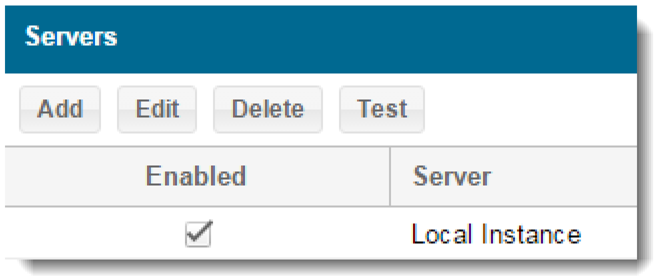
When attaching to the WebSocket, you need to provide a header with the API key. The header is called "**X-API-TOKEN**" and its value should be the string obtained from the command line in Step 1.

Once attached to the WebSocket, you can listen for messages. Each message is a JSON string representing a Content Analysis result. If sandboxing is enabled on Content Analysis but is configured to not wait for the sandboxing verdict, you will receive two results for each request that was sent to sandboxing. In other cases, there will be a single response for every request. The format of the JSON response is described in "Appendix A: Asynchronous Response Syntax" on page 47.

Step 3: Select IVM Profile

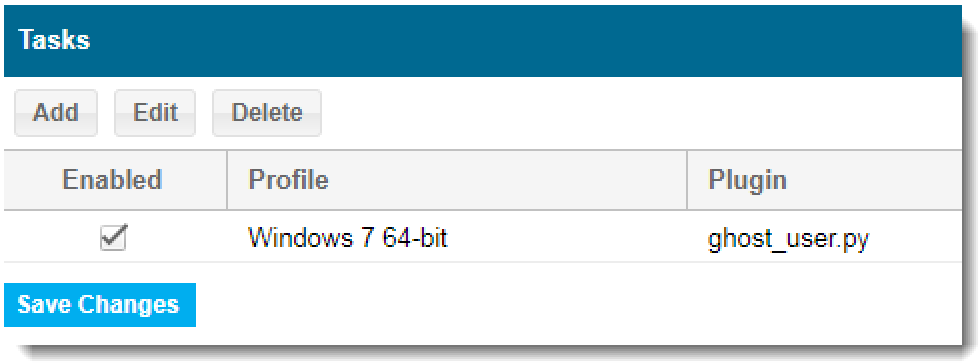
Select the IntelliVM profile you want the API to use for files that are submitted for scanning by Content Analysis. In the Content Analysis management console:

1. Select **Services > Sandboxing > Malware Analysis**.
2. In the *Servers* panel, make sure **Local Instance** is enabled.



Enabled	Server
✓	Local Instance

3. In the *Tasks* panel, specify your profile and plugin configuration.



Enabled	Profile	Plugin
✓	Windows 7 64-bit	ghost_user.py

4. Click **Save Changes**.

Step 4: Submit Files for Evaluation

Once you have an API key, are subscribed to the WebSocket, and have set the default IVM profile to use, you are ready to submit files for evaluation.

Sample python code to submit a file is available in the *Content Analysis WebGuide* on **Broadcom Tech Docs** .

The URL for file submission is `https://<server>:<port>/rapi/cas/scan`. **<server>** is the host name or IP address of Content Analysis, and **<port>** is the web management HTTPS port. The discussion in Step 2 about HTTP and HTTPS applies to this URL as well.

When submitting files, you need to provide a header with the options in the following table.

Header Option	Description	Required?
`X-API-TOKEN`	The API key string obtained from the command line in Step 1.	Yes
`X-Continue-After-Detection`	Indicates whether to send files for evaluation in the sandbox regardless of the verdict given from other configured services (such as AV or File Reputation Service). If set to **true**, this option ensures that regardless of what the other services may have found, the file is sent to sandboxing. For example, if an AV engine determines a file to be malicious but you still want the file to be analyzed by sandboxing, set this option to **true** so that it will be sent to the configured sandbox for additional analysis. If **X-Continue-After-Detection** is not included in the header (or is set to **false**), when a file has a malicious verdict from AV or FRS, it will not be sent to the sandbox for further analysis.	No
`X-Response-Wait-MS`	The number of milliseconds for CA to wait before returning the response to the HTTP POST request. If CA receives a verdict before the wait time is reached, it will return the response immediately. If **X-Response-Wait-MS** is set to 0 or not present in the header, all scan results are returned via the WebSocket, and only the server ID is returned as part of the POST.	No

Header Option	Description	Required?
`X-HID-Level`	To control the threshold and aggressiveness at which Advanced Machine Learning (AML) file blocking occurs, you can set the detection sensitivity level for files submitted through the API. Possible values are: ▪ 0 = known bad ▪ 1 = low ▪ 2 = medium ▪ 3 = high With a high detection sensitivity, AML will be aggressive in its determination of whether a file may be a threat, at the risk of blocking files that may not actually be malicious. With a lower sensitivity, AML will block fewer files but with a risk of some threats not being detected. Symantec recommends a high detection sensitivity for the strongest network security. If **X-HID-Level** is not set, the Detection Sensitivity level configured for Advanced Machine Learning in the Content Analysis Management Console will be used.	No

If you want to specify a client ID, provide it on the query string of the POST request to this URL as a parameter called client-id. For example: POST to `https://<server>:<port>/rapi/cas/scan?client-id=<client specified id>`

The response to the POST request will be a JSON string that indicates whether the response was accepted and, if it was accepted, the server ID assigned to this request. If the verdict was available, the POST response will contain the information and it will not be sent to the WebSocket. It is also possible for a partial verdict to come back via the POST response, and to later be updated via the WebSocket. The full format of these responses is described in "Appendix B: POST Response Syntax" on page 51. Sample JSON responses for successful and failed requests are listed in "Appendix C: Sample JSON" on page 52.

Example cURL submissions:

```
curl -X POST --form upload=@test.cmd https://casva:8082/rapi/cas/scan -H "X-API-
TOKEN:1d61ebd6a51b435999cd22e0373c41dc"
curl -X POST --form upload=@test.cmd https://casva:8082/rapi/cas/scan -H “X-Continue-After-
Detection:true” -H “X-API-TOKEN:1d61ebd6a51b435999cd22e0373c41dc”
curl -X POST --form upload=@test.cmd https://casva:8082/rapi/cas/scan -H “X-HID-Level:1” -H “X-API-
TOKEN:1d61ebd6a51b435999cd22e0373c41dc”
```

Appendix A: Asynchronous Response Syntax

Responses contain the following elements:

- **server_time** – The current time on the Content Analysis appliance in an extended ISO string
- **id** – The id that was assigned to the request when it was uploaded to the server
- **client_id** – If the client provided an id when it uploaded the request, it will be included here. Otherwise it will be an empty string
- **exec_time** – The elapsed time in milliseconds since this request was uploaded
- **filename** – The name of the file in the request
- **score** – An integer from **0**-**10**, with **0** meaning safe, **10** meaning malicious, and **5** meaning that the file is not known to be either definitely safe or definitely malicious.
- **status** – An integer representing the status of the request:
  - **0 (IN_PROGRESS)** – The response is not the final response; expect another response when sandboxing is complete.
  - **1 (COMPLETE)** – The response is the final response.
  - **2 (ERROR)** – Content Analysis was unable to fulfill the request.
  - **3 (COMPLETE_WITH_ERRORS)** – Some aspect of the request was unsuccessful, but Content Analysis still created a verdict from the other information it has.
- **expect_sandbox** – A Boolean that is true if an additional response with the sandboxing verdict is expected for this request

If file type and size policies didn't trigger an early verdict, the request also contains the following elements:

- **sha1** – The SHA1 hash of the file
- **sha256** – The SHA256 hash of the file
- **md5** – The MD5 hash of the file

If the status was **ERROR (2)**, the response also contains the following element:

- **error** – A human-readable string describing the reason for the error

If the file was sent to the File Reputation Service (FRS) the following element is present:

file_reputation

- **score** – An integer from **1** to **10**, with **10** indicating a known malicious file, and **1** indicating a known safe file. If the score was not present in the FRS database, this element will not be present
- **status** – The status of the FRS request, using the same enumeration as the global status

If the file was blocked or served because of the custom whitelist or blacklist on Content Analysis, the following element is present:

user_hash_list

- **score** – **0** for allowed by the custom whitelist, **10** for blocked by the custom blacklist
- **status** – The status of the user hash list, using the same enumeration as the global status

If the request was scanned by Cylance, the response includes the following element:

cylance

- **score** – An integer from **0** to **10**, with **10** being malicious and **0** being safe.
- **status** – The status of the Cylance request, using the same enumeration as the global status
- **data_version** – The version of the Cylance rules
- **engine_version** – The version of the Cylance binary
- **details** – Details from the Cylance evaluation of the file

If the Content Analysis policy triggered the verdict for the file, the following element is present:

policy

- **score** – **0** for allowed by policy, **10** for blocked by policy
- **status** – The status of the policy, using the same enumeration as the global status
- **code** – The reason code for which policy triggered the verdict. These codes are strings and are the same as the X-Error-Code values returned from ICAP. This field would be useful for automation as the strings will not change
- **details** – A human-readable explanation of which policy triggered the verdict

If AV scanning was run on the file and there were errors or a virus found, one or more of the following elements is present on the response:

- **kaspersky**
- **sophos**

- **mcafee**
- **symantec**

Each of the elements has the same sub-elements:

- **score** – **10** for known bad, **5** for not known bad
- **risk_score** – From AML heuristics, a scale of **1**-**10** with **10** for known bad
- **status** – The status of the antivirus request, using the same enumeration as the global status
- **engine_version** – The version of the binary for the vendor
- **pattern_version** – The version of the patterns in use for the vendor
- **pattern_date** – The date and time of the patterns in use
- **file_name** – The file name that caused the AV verdict
- **subfile_name** – The file within the file that caused the AV verdict
- **error_code** – **"virus_found"** or any of the **X-Error-Code** values returned from ICAP. This field is suitable for machine consumption as the strings will not change
- **error_details** – A human-readable string indicating the reason for the verdict

If a virus was found, it also contains the following element:

- **virus_name** – The name assigned to the virus by the AV vendor

If the file was evaluated using a sandbox and found to be a threat, one or more of the following elements is present on the response:

- **malware_analysis**
- **fireeye**
- **lastline**
- **cloud_sandboxing**

Each of these elements has the same sub-elements:

- **score** – For Malware Analysis, an integer from **0** to **10**, with **10** indicating a malicious file. FireEye returns either **0** for safe or **1** for malicious. Lastline uses a scale from **0**-**100** with **100** indicating malicious. Cloud Sandboxing returns a **0** (safe) or **10** (malicious) score.
- **status** – The status of the sandboxing request, using the same enumeration as the global status
- **report_url** – A URL for a detailed report about the sandboxing task
- **pdf_url** – A URL where a detailed report in PDF form can be obtained

CA 2.3.5 and higher releases: If the file was evaluated using a sandbox, an additional response (after the initial WebSocket message) sends details about the sandboxing tasks and where to poll for them:

- **sandbox_tasks** – Connection information and task IDs for the configured sandbox. Note that these details are not available for FireEye NX.
- **server_url** – The URL of the sandbox server. For Malware Analysis, a port must also be specified (for example, **https://203.0.113.100:8082**).
- **task_ids** – The ID number(s) assigned to the task(s) for the submitted file
- **type** – The type of sandbox processing the sample: **malware_analysis**, **fireeye**, **lastline**, **cloud_sandboxing**.

Appendix B: POST Response Syntax

The response contains the following elements:

- **api_version** – 1
- **exec_time** – The elapsed time, in milliseconds, that it took to process this request and add the request to the processing queue
- **server_time** – The current time on the Content Analysis appliance in an extended ISO string
- **request** – **"POST /rapi/cas/scan"**
- **sandbox_tasks** – Connection information and task IDs for the configured sandbox. Note that the sandbox task IDs may be returned in the initial post response, depending on how long the timeout is configured for and if the task IDs are available by the time the response is sent. However, if the client does not wait for a full response, then the sandbox task IDs will not be available and will not be included in the POST response. *Available in CA 2.3.5 and higher releases*

result

- **status** – Either **ERROR (0)** or **IN_PROGRESS (1)**, using the same enumeration as the global status in the asynchronous responses

If the status is **ERROR (0)**, the following element is present under the result:

- **error** – The reason the request was rejected, currently one of:
    - **"Unauthorized"** – The API key provided could not be verified.
    - **"No file uploaded"** – The file was not found in the upload.
    - **"Multiple files not supported"** –There were multiple files in the upload.

Otherwise, the following element is present under the result:

- **id** – The server-assigned ID for this request (string)

Appendix C: Sample JSON

Sample POST Responses

A response to a successful request:

```
{

   "client_id": ",
   "exec_time": 0.0188,
   "expect_sandbox": False,
   "filename": "PDF_V1_5_MPP.pdf",
   "id": "8d610cdd-1eec-40f5-af63-6e48f463b20b",
   "request": "POST /rapi/cas/scan",
   "sandbox_tasks": [
    {
      "server_url": "https://203.0.113.100:8082",
      "task_ids": [
       "1422"
       "1423"
      ],
      "type": "malware_analysis"
    }
   ],
   "score": 5,
   "server_time": "2019-12-29T14:01:20.821277",
   "sha1": "a7d96611b23ad872cbe96c235c1f0b3ea0977655",
   "status": 1

}
```

A response to a failed request

```
{

   "client_id": ",
   "exec_time": 0.0188,
   "expect_sandbox": False,
   "filename": "PDF_V1_5_MPP.pdf",
   "id": "8d610cdd-1eec-40f5-af63-6e48f463b20b",
   "request": "POST /rapi/cas/scan",
   "score": 5,
   "server_time": "2019-12-29T14:01:20.821277",
   "sha1": "a7d96611b23ad872cbe96c235c1f0b3ea0977655",
   "result": {

      "error": "Unauthorized",
      "status": 0
      }

}
```

Sample Asynchronous Responses

A successful response:

```
{

   "server_time": "2019-01-15T18:34:33.941133",
   "id": "8d610cdd-1eec-40f5-af63-6e48f463b20b",
   "client_id": "15f80202-1b0c-4cd9-a467-75cc3d4f26c9",
   "score": 10,
   "exec_time": 0.103,
   "status": 1,
   "sha1": "4660dcd9b6b1f436d7fa202ad1889f6e7fda77d5",
   "sha256": "ace4012e8b1789554d2bd8fba106bbee0cb4f088c91ff7f38ea21e810f61299f",
   "md5": "aa7e92df14f21eb6eca314d161c20c52",
   "expect_sandbox": false,
   "file_reputation": {

      "status": 1,
      "score": 8

   },
   "user_hash_list": {

      "status": 1,
      "score": 10

   },
   "cylance": {

      "status": 1,
      "score": 5,
      "data_version": "1235.78",
      "engine_version": "1234.1",
      "details": ""

   },
   "policy": {

      "status": 1,
      "score": 10,
      "code": "blocked_extension",
      "details": "Blocked extension detected: exe"

   },
   "symantec": {

      "status": 1,
      "score": 5,
      "engine_version": "1.0.1.18",
      "pattern_version": "20170817.186908",
      "pattern_date": "2019/08/18"

   },
   "sophos": {

      "status": 1,
      "score": 10,
      "engine_version": "3.69.3",
      "pattern_version": "5.42",
      "pattern_date": "2019/08/17",
      "virus_name": "Something nasty",
      "file_name": "archive.zip"
      "subfile_name": "dir/something.exe",
      "error_code": 25,
      "error_details": "Virus found in something.exe: Something nasty"

   },
   "bcma": {
```

```
            "status": 1,
            "score": 5,
            "report_url": "http://ma/report/taskid",
            "pdf_url": "http://ma/report/taskid.pdf"

         },
         "lastline": {

            "status": 1,
            "score": 3,
            "report_url": "http://url",
            "pdf_url": ""

         },
         "FireEye": {

            "status": 1,
            "score": 0
            "report_url": "http://url",
            "pdf_url": ""

         }

      }
```

An error case:

```
      {
      "server_time": "2019-01-15T18:34:33.941133",
      "id": "8d610cdd-1eec-40f5-af63-6e48f463b20b",
      "client_id": "15f80202-1b0c-4cd9-a467-75cc3d4f26c9",
      "exec_time": 0.133,
      "status": 2,
      "error": "Bad request"
      }
```

A partial success:

```
      {

         "server_time": "2019-01-15T18:34:33.941133",
         "id": "8d610cdd-1eec-40f5-af63-6e48f463b20b",
         "client_id": "15f80202-1b0c-4cd9-a467-75cc3d4f26c9",
         "score": 5,
         "exec_time": 0.103,
         "status": 3,
         "sha1": "4660dcd9b6b1f436d7fa202ad1889f6e7fda77d5"
         "sha256": "ace4012e8b1789554d2bd8fba106bbee0cb4f088c91ff7f38ea21e810f61299f",
         "md5": "aa7e92df14f21eb6eca314d161c20c52",
         "file_reputation": {

            "status": 1,
            "score": 8

         },
         "user_hash_list": {

            "status": 1,
            "score": 10

         },
         "symantec": {
```

```
      "status": 2,
      "score": 5,
      "engine_version": "1.0.1.18",
      "pattern_version": "20170817.186908",
      "pattern_date": "2019/08/16",
      "file_name": "something.exe",
      "subfile_name": "",
      "error_code": "decompression_error",
      "error_details": "failed to decompress archive: 0x80034233"

   },
   "lastline": {

      "status": 2,
      "error": "Connection error"

   },
   "FireEye": {

      "status": 1,
      "score": 0

   }

}
```

Appendix D: Example Python Scripts

Example Python Code: WebSocket Task_Complete Notifications

This example demonstrates how to receive basic notifications for completed tasks. Note that only on-box sandboxing results are sent over this WebSocket. It does not include results from antivirus or other Content Analysis scanning technologies.

```
# DISCLAIMER: This code is for API demonstration purposes only.
# It is not indented for production use without modification.
Description: This example demonstrates using WebSockets to receive task_complete notifications. Note
that no authentication is performed in this script, so it will only work on CA systems where
authentication has been disabled.
"""
import sys
import argparse
import json
import ssl
from websocket import create_connection
def parse_message(msg, min_score):
      msg = json.loads(msg)
      score = msg['task']['tasks_global_risk_score']
      if int(score) < min_score:
      return
      sample = msg['sample']
      rsrc = sample['sample_resources'].values()[0]
      magic = rsrc['resource_magic_magic']
      md5 = rsrc['sample_resources_md5']
      print('%s %d %s' % (md5, score, magic))
def listener(server, min_score, key):
      url = "wss://%s/rapi/ws/task_complete/*" % server
      ssl_options = {'cert_reqs': ssl.CERT_NONE} # bypass certificate verification
      ws = create_connection(url, header={'X-API-TOKEN': key}, sslopt=ssl_options)
      while True:
            parse_message(ws.recv(), min_score)
      ws.close()
def main(server, min_score, key):
      listener(server, min_score, key)
if __name__ == '__main__':
      parser = argparse.ArgumentParser(description='example multiple websocket client')
      parser.add_argument('--key', type=str, required=True, help="Use specified API key to
      authenticate.")
      parser.add_argument('--min-score', type=int, default=0, help='only display tasks over this
      score')
      parser.add_argument('server', type=str, default=['localhost'], help='server address')
      args = parser.parse_args()
      sys.exit(main(**vars(args)))
```

Example Python Code: Submit Files to Content Analysis

This example submits files to Content Analysis for evaluation over the REST API. You should first subscribe to the websocket using cas-websocket.py in order to see the responses.

```
#-------------------------------------------------------------------------------
# Dependencies: websocket-client, requests
#
# websocket-client can be downloaded from:
# https://pypi.python.org/pypi/websocket-client
#
# requests can be downloaded from:
# https://codeload.github.com/kennethreitz/requests/legacy.tar.gz/master
#-------------------------------------------------------------------------------
"""
Description: This example submits files to Content Analysis for evaluation over
the REST API. You should first subscribe to the websocket using cas-websocket.py
in order to see the responses.
"""
import sys
import argparse
import json
import ssl
import requests
import os.path
def main(args):
      secure_prefix="s"
      if bool(args.insecure):
            secure_prefix=""
      token = args.key;
      # If no API key is specified, try to acquire one
      if len(token) == 0:
            # Authenticate and get a token
            auth_url = "http%s://%s/rapi/auth/session" % (secure_prefix, args.host)
            auth_message = { 'username': args.username, 'password': args.password      }
            r = requests.post(auth_url, data=auth_message, verify=False)
            if not r.ok:
                  print "failed to authenticate"
                  print r
                  print r.content
                  return -1
            auth = r.json()
            token = auth["results"]["session_token_string"]

      headers = {'X-API-TOKEN': token, ‘X-Response-Wait-MS’: 1000}
      #CA scan request
      basename = os.path.basename(args.file.name)
      ma_files = { basename: (basename, args.file, 'application/octet-stream') }
      scan_url = "http%s://%s/rapi/cas/scan?token=%s" % (secure_prefix, args.host, token)
      r = requests.post(scan_url, files=ma_files, verify=False, headers=headers)
      if not r.ok:
            print "Failed to scan Content Analysis"
            print r
            print r.content
            ws.abort()
            return -1
      print "Success!"
      print r.json()
if __name__ == '__main__':
      parser = argparse.ArgumentParser(description='simple CA websocket example')
      parser.add_argument('-s', '--host', default='localhost', help='CA hostname or IP address')
      parser.add_argument('-u', '--username', type=str, required=False, default='admin')
      parser.add_argument('-p', '--password', type=str, required=False, default='admin')
      parser.add_argument('-o', '--owner', type=str, required=False, default='admin')
      parser.add_argument('-f', '--file', type=argparse.FileType('rb'), required=True)
      parser.add_argument('-k', '--key', type=str, required=False, help='The API Key to use')
      parser.add_argument('-i', '--insecure', required=False, default=False, action='store_true')
      sys.exit(main(parser.parse_args()))
```

Example Python Code: WebSocket Scan Notifications

This example demonstrates using websockets to receive scan notifications from the REST API in Content Analysis.

```
#--------------------------------------------------------------------------------
# Dependencies: websocket-client, requests
#
# websocket-client can be downloaded from:
# https://pypi.python.org/pypi/websocket-client
#
# requests can be downloaded from:
# https://codeload.github.com/kennethreitz/requests/legacy.tar.gz/master
#--------------------------------------------------------------------------------
"""
Description: This example demonstrates using websockets to receive scan
notifications from the REST API in Content Analysis. Submit files using
cas-submit.py.
"""
import sys
import argparse
import json
from websocket import WebSocketConnectionClosedException
from websocket import create_connection
import ssl
def websocket_scan_thread(ws):
      while True:
            msg = ""
            try:
                  msg = ws.recv()
            except WebSocketConnectionClosedException as e:
                  print("Failed to receive: %s" % (e))
                  return

            try:
                  print msg
                  msg = json.loads(msg)
                  #TODO: parse fields out of the json. Right now it just
                  # verifies that it is json
            except:
                  print("Message in unexpected format: '%s'" % msg)
def main(args):
      secure_prefix="s"
      if bool(args.insecure):
            secure_prefix=""
      token = args.key;
      # If no API key is specified, try to acquire one
      if len(token) == 0:
            # Authenticate and get a token
            auth_url = "http%s://%s/rapi/auth/session" % (secure_prefix, args.host)
            auth_message = { 'username': args.username, 'password': args.password    }
            r = requests.post(auth_url, data=auth_message, verify=False)
            if not r.ok:
                  print "failed to authneticate"
                  print r
                  print r.content
                  return -1
            auth = r.json()
            token = auth["results"]["session_token_string"]
      headers = {'X-API-TOKEN': token}
      #subscribe to the websocket
      url = "ws%s://%s/rapi/ws/cas_task" % (secure_prefix, args.host)
      ws = create_connection(url, sslopt={"cert_reqs": ssl.CERT_NONE}, header=headers)
      thread = websocket_scan_thread(ws)
      thread.start();

if __name__ == '__main__':
      parser = argparse.ArgumentParser(description='simple CA websocket example')
      parser.add_argument('-s', '--host', default='localhost', help='CA hostname or IP address')
      parser.add_argument('-u', '--username', type=str, required=False, default='admin')
      parser.add_argument('-p', '--password', type=str, required=False, default='admin')
      parser.add_argument('-k', '--key', type=str, required=False, help='The API Key to use')
      parser.add_argument('-i', '--insecure', required=False, default=False, action='store_true')
      sys.exit(main(parser.parse_args()))
```