# Lastline Enterprise Streaming API

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6950 Hollister Avenue, Suite 100
Goleta, CA 93117
lastline.com | 805.456.7076

# 1 Introduction

# 2 Overview of the Streaming API

## 2.1 Glossary

This section will briefly explain the meaning of some of the terms used in this guide.

### 2.1.1 Trigger category

A trigger category represents a type of event for which notifications should be sent. Notifications can be triggered by different classes of events. When configuring a notification the user must specify for which trigger notifications should be sent.

### 2.1.2 Appliance trigger

Trigger category related to events concerning appliances status. Can be either appliance-checkin (An occurrence of an appliance checkin) or appliance-message (Status messages from components of an appliance).

### 2.1.3 Audit trigger

Trigger category related to audit events (relevant actions performed by a user account on the web portal). The audit event categories are the following:

- authentication: authentication related actions (e.g., a user logged in to the portal) (available from format version 7.10)
- configuration: appliance related actions (e.g., the reconfiguration of an appliance)
- registration: customer/account/license related actions (e.g., the creation of a new customer)

### 2.1.4 Network trigger

Trigger category related to network events. These events are currently:

- malware Command and Control traffic
- drive-by download
- fake anti-virus software activity
- malicious file download
- suspicious network activity
- suspicious URL activity (available from format version 7.10)
- Lastline network test
- unwanted software activity (e.g., adware)

### 2.1.5 Mail trigger

Trigger category for email detection events. Suspicious or malicious emails can be detected because of attachments, URLs or other characteristics of the message.

### 2.1.6 Test trigger

Trigger category for testing events. A notification can be triggered from the UI to verify that the Streaming API was successfully configured.

### 2.1.7 Intrusion trigger

Trigger category related to intrusion events (Available from format version 8.1)

## 2.2 Architecture

The Streaming API is based on a publish-subscribe architecture, where notifications about above mentioned events are pushed on an event stream and a user, after subscribing to the stream, is able to consume them.

The event stream consists of a sequence of messages encoded in a simple newline-terminated JSON format, where each new line of text is a self-contained JSON event.

The content of messages from the stream differs depending on the event that has been triggered.
The guide will now list the fields that compose each JSON event for the different types of event.

### 2.2.1 Appliance trigger fields

- format_version: version of the notification format, currently "8.1"
- trigger type: type of the trigger (i.e., appliance checkin or appliance message)
- timestamp: timestamp of the event as reported by the appliance
- appliance uuid: unique identifier of the interested appliance
- appliance type: type of the interested appliance
- impact: impact of this event, ranging from 0-100
- appliance detail link: link to the status page of this appliance
- appliance attributes:
  - private ip address
  - public ip address
  - fully qualified domain name
- special fields:
  - is online (checkin event only)
  - last checkin timestamp (checkin event only)
  - source (message event only). Source and key together provide an identifier of what is being reported. Possible values for source.key are listed in table 2.
  - key (message event only): Source and key together provide an identifier of what is being reported. Possible values for source.key are listed in table 2.
  - component name (message event only): name of the component that sent the message. Possible values are listed in table 2.
  - detail name (message event only). Possible values are listed in table 2.
  - message (message event only)

### 2.2.2 Audit trigger fields

- event_type: "audit-event"
- format_version: version of the notification format, currently "8.1"
- description: extended description of the action
- impact: impact of this action, ranging from 0-100
- timestamp: timestamp of the event
- account: account of the user that performed the logged action
- customer: customer to which the action refers
- source_ip: ip address of the user that performed this action
- audit_action_type: type of the audit action, some of the possible values are described in table 1
- audit_event_category: category of the audit action, currently one of:
  - registration: account/customer/license related actions
  - configuration: appliance related actions
- affected_entity_type: type of the object affected by this action (e.g., "license", "account", "appliance")
- affected_entity_id: identifier of the object affected by this action (e.g., the license key, name of the account, uuid of the appliance)
- audit_event_id: identifier of the audit event
- event_detail_link: a link to the details of this audit action on the user website
- device_id: unique identifier of the manager appliance (on-premise only)
- configured_software_version: version of the software that has been reconfigured (appliance_upgraded events only)

| Action type | Description |
|---|---|
| account_blocked | Account blocked |
| account_created | Account created |
| account_deleted | Account deleted |
| account_permission_granted | Permission granted to an account |
| account_permission_revoked | Permission revoked from an account |
| account_unblocked | Account un-blocked |
| account_updated | Account details updated |
| api_token_reset | License API-token set to a new value |
| appliance_rebooted | The appliance has been rebooted |
| appliance_reconfigured | The appliance has been reconfigured |
| appliance_upgraded | The software version of the appliance has been upgraded |
| checkpoint_certificate_added | A checkpoint certificate was added |
| checkpoint_certificate_deleted | A checkpoint certificate was deleted |
| checkpoint_notification_created | Notifications via Checkpoint was configured |
| checkpoint_notification_updated | A checkpoint notification configuration configuration was updated |
| email_changed | Account email updated |
| failed_login | A user failed to login to the specified account |
| httppost_notification_created | Notifications via HTTP Post was configured |
| httppost_notification_updated | A HTTP Post notification configuration was updated |
| invalid_credentials | Invalid credentials |
| license_created | New license generated |
| license_updated | License details updated |
| mail_notification_created | Notifications via mail was configured |
| mail_notification_updated | A mail notification configuration was updated |
| notification_deleted | A notification configuration was deleted |
| password_changed | Account password updated |
| password_reset | Password reset performed |
| password_reset_request | Password reset requested |
| sensor_added | A sensor was added |
| sensor_updated | A sensor was updated |
| siem_notification_created | Notifications via SIEM was configured |
| siem_notification_updated | A SIEM notification configuration was updated |
| streaming_notification_created | Notifications via streaming API was configured |
| streaming_notification_updated | A streaming API notification configuration was updated |
| successful_login | A successful login was performed for the account |
| successful_logout | An account successfully logged out |
| tanium_server_added | A tanium server configuration was added |
| tanium_server_deleted | A tanium server configuration was deleted |
| tanium_server_updated | A tanium server configuration was updated |
| tippingpoint_notification_created | Notifications via TippingPoint was configured |
| tippingpoint_notification_updated | A TippingPoint notification configuration was updated |
| wmi_source_configured | A WMI source was configured for session management |
| wmi_source_deleted | A WMI source configuration was deleted |

Table 1 Possible values for appliance trigger fields

| component_name | source.key | detail_name |
|---|---|---|
| Analysis | appliance_update.analysis.anonvpn | Traffic Routing |
| Analysis | appliance_update.analysis.lladoc | Document Analyzer |
| Analysis | appliance_update.analysis.llama | Windows Sandbox |
| Analysis | appliance_update.analysis.lldroid | Android Analyzer |
| Analysis | appliance_update.analysis.llweb | URL/PDF Sandbox |
| Analysis | appliance_update.analysis.processing | Processing |
| Database | appliance_update.db.server | Database Server |
| Disk Usage | sys.disk.usage | Disk Usage |
| Email Analysis | appliance_update.mail.llmail | Email Analysis Service |
| Email Analysis Service | llmail.receiver | Email receiver |
| Email Analysis Service | llmail.sharduploader.upload | Email metadata uploader |
| Email Analysis Service | llmail.smtpsender-dsn.message | SMTP bounce sender message status |
| Email Analysis Service | llmail.smtpsender-dsn.server | SMTP bounce sender server status |
| Email Analysis Service | llmail.smtpsender.message | SMTP sender message status |
| Email Analysis Service | llmail.smtpsender.server | SMTP sender server status |
| ICAP | appliance_update.icap.cicap | ICAP Server |
| IDS Service | llsnifflogmon.suricata.ruleparsing.customer | Customer Rule |
| Integrations | appliance_update.integration.session_tracker | Session Tracker Service |
| Integrations | appliance_update.integrations.notification-proxy_status | Notification Delivery Service |
| Integrations | appliance_update.integrations.session_tracker | Session Tracker Service |
| Management | appliance_update.mgmt.appliance_update | Lastline Update Service |
| Management | appliance_update.mgmt.lload | Load Monitoring Service |
| Management | appliance_update.mgmt.version | Version Update Service |
| Message Processing | appliance_update.mq.broker | Message Broker |
| Message Processing | appliance_update.mq.queue_workers | Message Processors |
| Monitoring | appliance_update.monitoring.llpsv | Sniffer Service |
| Monitoring | appliance_update.monitoring.suricata | IDS Service |
| Notification Delivery Service | notification.server.checkpoint | Checkpoint Server Status |
| Notification Delivery Service | notification.server.email | Email Server Status |
| Notification Delivery Service | notification.server.httppost | HTTP Server Status |
| Notification Delivery Service | notification.server.siem | SIEM Server Status |
| Notification Delivery Service | notification.server.tipping_point | TippingPoint SMS Server Status |
| Queue Status | analyst_scheduler.status.capacity_percent | Analysis Queue - Load |
| Queue Status | analyst_scheduler.status.pickup_delay | Analysis Queue - Analysis Delay |
| Queue Status | analyst_scheduler.status.tasks_queued | Analysis Queue - Pending Tasks |
| Session Tracker Service | session-tracker.wmi_query | Session Tracker Query Status |
| System | appliance_update.action.configure | Configuration |
| System Status | appliance_update.appliance_clock | Appliance Clock |
| Threat Intelligence Replication | db.monitor_slave.io | Threat Intelligence Replication IO |
| Threat Intelligence Replication | db.monitor_slave.sql | Threat Intelligence Replication SQL |
| Traffic Routing | anonymity_provider.status | Traffic Routing Check |
| Windows Sandbox | analyst_daemon.llama.configuration | Sandbox Configuration Data |

Table 2 Possible values for appliance trigger fields

| action_name | description |
|---|---|
| BLOCK_EMAIL | The whole mail message was blocked |
| BLOCK_ATTACHMENT | The attachment contained in the mail message was blocked |
| BLOCK_URL | The url contained in the mail message was blocked |
| WARN | A warning was issued about the content of the mail that triggered this mail event |
| LOG | The mail event was only logged |
| UNKNOWN | An unknown action was taken in response to this event |

Table 3 Possible values for mail event action

### 2.2.3 Network trigger fields

Based on the configuration, information about the pcap related to the network event might be included in the notification. If multiple pcaps are available for a single event, multiple notifications for the same network event will be sent (with different pcap information).

- format_version: version of the notification format, currently "8.1"
- description: description of the event (e.g., Suspicious DNS Resolution)
- impact: impact of this event, ranging from 0-100
- detection_type: type of the detection (e.g., dns-resolution)
- start_timestamp: start timestamp of the event
- end_timestamp: end timestamp of the event
- malware_class: class of the detected malware
- malware: name of the detected malware
- action: action taken in response to this event
- occurrences: number of occurrences of this event
- dst_port: destination port of the event
- event_id: identifier of the event
- src_ip: source ip address of the event
- dst_ip: destination ip address of the event
- src_mac: source mac address of the event
- transport_protocol: transport layer protocol used by the event
- dst_host: destination hostname of the event
- resolved_domain: resolved destination domain
- src_dns_domain: hostname of the source
- event_detail_link: link to details about this event on the user website
- detection_id: obfuscated string representing the concatenation of threat, activity and detector id
- device_id: obfuscated identifier of the appliance

- event_url: URL of the network event, in case of a file download this will be the URL the file was downloaded from, otherwise it will be the URL directly associated with the network event
- incident information:
  - incident_id: identifier of the incident related to this event
  - incident_impact: impact of the incident related to this event
  - incident_malware: name of the malware involved in the incident
  - incident_malware_class: name of the malware family involved in the incident
- malicious file information:
  - file_name
  - file_md5: MD5 hash
  - file_sha1: SHA-1 hash
  - file_size
  - file_type
  - file_detail_link: link to details about this malicious file on the user website
- suspicious url information:
  - url_detail_link: link to details about the suspicious URL on the user website (this field is available only from format version 7.10)
- logged_users: list users that were logged on at the time of the event
- custom intelligence fields:
  - custom_intel_last_modified: last modification time of this entry
  - custom_intel_source: name of the source
  - custom_intel_comment: comment on the intel entry
  - custom_intel_message (ids rules only): rule message
  - custom_intel_detection_id (ids rules only): string representing the concatenation of group rule and revision id
- pcap fields:
  - pcap_id: identifier of the pcap related to this event
  - pcap_start_time: start time of the pcap
  - pcap_src_ip: source IPV4 address of the pcap
  - pcap_src_port: source port of the pcap
  - pcap_dst_ip: destination IPV4 address of the pcap
  - pcap_dst_port: destination port of the pcap
  - pcap_urls: list of URLs associated with this pcap
  - pcap_hosts: list of contacted hostnames from the pcap
  - pcap_in_bytes: number of bytes received
  - pcap_out_bytes: number of bytes sent

- pcap_threats: list of threats involved in this pcap
    - pcap_protocols: list of protocols
    - pcap_successful_connections: number of successful connections from the pcap
    - pcap_failed_connections: number of failed connections from the pcap
    - pcap_body: base64 encoded, raw binary content of the traffic capture (might be truncated if too long)

### 2.2.4 Mail trigger fields

- format_version: version of the notification format, currently "8.1"
- description: description of the event (i.e., "Suspicious Email Attachment")
- impact: impact of this event, ranging from 0-100
- detection_type: type of the detection (i.e., "email-attachment")
- timestamp: timestamp of the event
- sender: sender of the email message
- recipients: recipients of the email message
- subject: subject of the mail message
- device_id: obfuscated identifier of the appliance
- action: action taken in response to this event, some of the possible values are described in table 3 (available from format version 7.6)
- attachment information (email-attachment type only):
    - file_name
    - file_md5: MD5 hash
    - file_sha1: SHA-1 hash
    - file_size
    - file_type
    - file_detail_link: link to to details about this attachment on the user website
- url information (email-url type only):
    - mail_url: url found in the mail message
    - mail_url_md5: MD5 hash of the url
- mail message information(email-message type only): (available from format version 9.1)
    - detectors: detectors that flagged this piece of mail
    - threat: threat that was detected
    - threat_class: threat class of the detected threat
- event_detail_link: link to details about this event on the user website

### 2.2.5 Test trigger fields

- format_version: version of the notification format, currently "8.1"
- description: description of the event (i.e., "User triggered test event")
- impact: impact of this event, currently 10 for tests
- trigger type: type of the trigger (i.e., "test-notification")
- timestamp: timestamp of the event
- test_uuid: unique identifier for the test
- notification_config_id: unique identifier for the notification configuration

### 2.2.6 Intrusion trigger fields

- correlation_rule: the correlation rule that caused the event
- description: short description of the event. (e.g., "Detected intrusion")
- device_id: obfuscated identifier of the appliance
- end_timestamp: end time of the event
- extended_description: detailed information about the intrusion event (e.g., "Correlated 3 incidients into an intrusion")
- format_version: version of the notification format, currently "8.1"
- hosts_affected: a sequence of each host with the threats and attack stages associated with it
- impact: the impact of the intrusion (only available from format 9.1)
- intrusion_details_link: A URL that links to the intrusion details page for this intrusion in the Lastline Portal.
- intrusion_name: the name of the intrusion
- intrusion_uuid: the unique identifier of the intrusion
- last_modified: last modification time of this entry
- most_advanced_stage: the most advanced attack stage
- nr_affected_hosts: number of affected hosts in the intrusion
- nr_malware: number of distinct malware in the intrusion
- reason: the reason behind the intrusion event
- start_timestamp: start timestamp of the event
- trigger_type: type of the trigger (i.e., "intrusion-event")

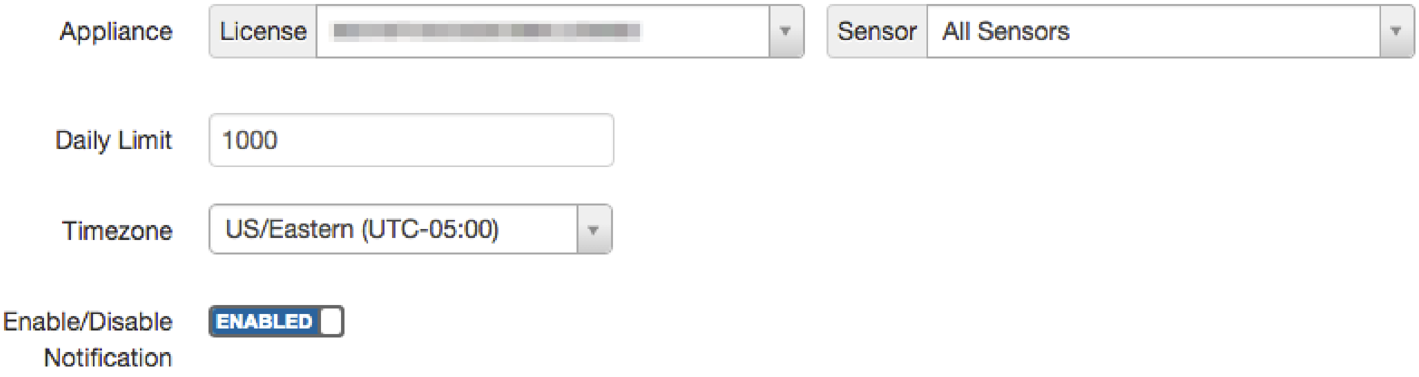
## 3 Configuration

To be able to consume from the stream of events, the user first needs to configure the stream itself. An event stream can be configured by either using the notification API or through the configuration UI. Either way, at the end of the configuration the user will have the URL needed to subscribe to the event stream and receive updates about events.

### 3.1 Configuring an event stream through the UI

On the web interface of the Manager, go to Admin → Integration → Streaming API.

Click on the "+" button on the right side to enter the creation screen.



Appliance: License [redacted] Sensor: All Sensors

Daily Limit: 1000

Timezone: US/Eastern (UTC-05:00)

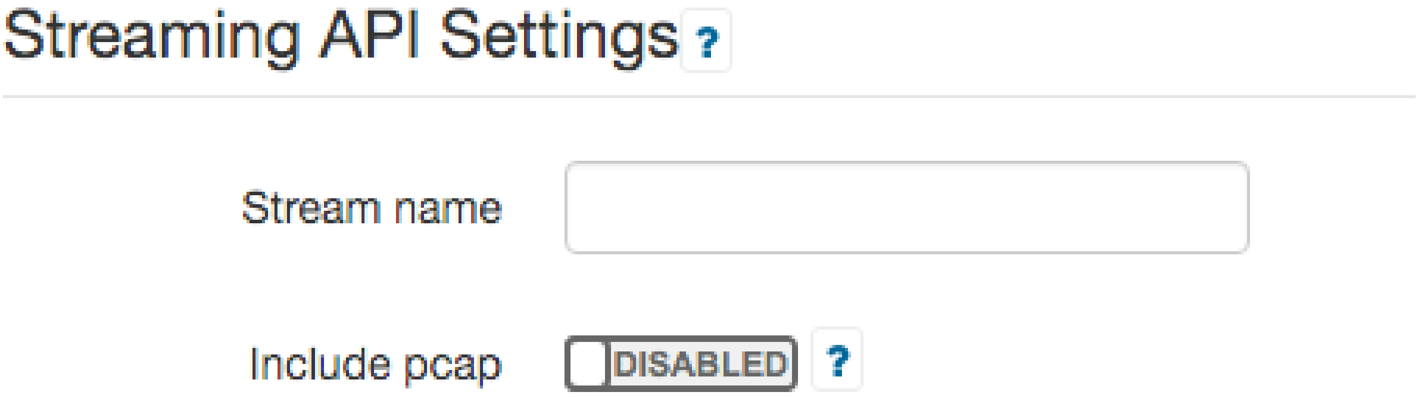
Enable/Disable Notification: ENABLED

Streaming Notification common settings

On the upper part of the screen are the standard notification settings:

- Appliance: select the license of the appliance that will trigger the notification
- Sensor: select the sensor on a given license that will trigger the notification
- Timezone: timezone to be used to determine the daily limit
- Enable/Disable Notification: click to enable/disable the notification

Then proceed to configure the settings which are specific for this notification:



Streaming API Settings ?

Stream name:

Include pcap: DISABLED ?

Streaming Notification special settings

- stream name: name of the new streaming notification (name for the stream in the UI)
- include pcap: whether to include pcap information inside the notification for network events

## 3.2 Configuring an event stream through the notification API

It is also possible to configure a new stream by making a POST request to /papi/notification/add/streaming, having some POST parameters in common with methods to add other notification types:
(see https://user.lastline.com/papi-doc/api/html/notification/overview.html#notification.add_siem_notification for their meaning)

- key
- access_key_id
- subkey_id
- timezone
- enabled
- max_daily_notifications
- validity_interval_seconds
- triggers

and special ones for this configuration:

- stream_name: name of the new streaming notification (name for the stream in the UI)
- include_pcap: whether to include pcap information inside the notification for network events

A successful response will contain the usual notification_config_id and stream_url to access the stream.

## 3.3 Consuming from the stream

The stream can be accessed at the URL returned by the previous step, with authentication based on username and password. To consume from the stream and receive the sequence of messages (if any) the user needs to make an HTTPS GET request, using the standard If-Modified-Since and If-None-Match HTTP headers to control which messages it is interested in receiving.

The push-based stream is implemented using long-polling. This means that if the server has no new events for the client, it will not return a response until new data arrives, therefore the request will hang. If new events arrive, they are sent to the client with a response containing the Last-Modified and Etag headers. Upon reception the client, in principle, should make a new HTTP request with updated If-Modified-Since header (based on Last-Modified response header) and If-None-Match header (based on ETag response header) to receive new messages.

Events in the stream have a maximum time-to-live (tipically 2 hours). After this time, events will be discarded and will no longer be served regardless of If-Modified-Since header values. Also, there's a maximum number of messages that can be maintained for each stream at the same time. If this number is exceeded oldest messages are removed.

### 3.3.1 Sample client

The following is a sample long-polling python client to consume messages from a configured stream

Sample long-polling client

```
import time
import sys
import requests
from urllib import urlencode

def main():
    if len(sys.argv) != 2:
        print >> sys.stderr, "Usage: %s <url>" % sys.argv[0]
        return 1

    # url of the stream obtained from the configuration step
    url = sys.argv[1]
    headers = {}
    s = requests.Session()

    params = {
        "username": "pippo",
        "password": "goofy",
    }

    while True:
        response = s.get(
            url,
            params=urlencode(params),
            headers={k: v for k, v in headers.items() if v})
        sc = response.status_code
        if sc != 200:
            print >> sys.stderr, "Unexpected status code (%s)..." % sc
            time.sleep(5.0)
            continue

        headers = {
            "If-Modified-Since": response.headers.get("Last-Modified", None),
            "If-None-Match": response.headers.get("Etag", None),
        }
        lines = response.content.splitlines()
        print "Lines: %d (%d bytes)" % (len(lines), len(response.content))
        for i, l in enumerate(lines):
            print "%03d: %s" % (i + 1, repr(l))


if __name__ == "__main__":
    sys.exit(main())
```

## 3.4 Papi client

A more structured and polished implementation of a sample long-polling client, that can be used to subscribe to a push stream channel to retrieve notifications, is included in the papi-client distribution, in "scripts/streaming_api_client.py".

Create a configuration file with the following structure:

```
[streaming]
username =
password =
url =
verify_ssl =
headers_storage_file =
```

where:

- username: Lastline portal account username
- password: Lastline portal account password
- url: URL returned after configuring an event stream, as described in 3
- verify: whether to perform SSL certificate validation
- headers_storage_file: name of the file where the response Last-Modified and Etag header values will be stored, which the client will provide as If-Modified-Since and If-None-Match header values in subsequent requests.

Then simply execute the script specifying the configuration file with the "-c" argument.

## 3.5 Testing Streaming API

To make sure that the Streaming API has been correctly configured, run the sample client after setting URL and credentials, generate a request that will trigger one of the configured events, for example "curl test.lastline.com", then check if a message was pushed on the stream and the client was able to consume it.

## 3.6 Streaming API examples

The guide will now show a few sample notifications (after deserializing received json strings) from event streams.

### 3.6.1 Test event notifications

Example of a notification triggered for testing

```
    {"format_version": "7.5",
    "description": "User triggered test event",
    "impact": 10,
    "trigger_type": "test-notification",
    "timestamp": "2015-08-27 14:16:06+00:00",
    "test_uuid": "3dc144bdb3434b1abf7a465de3f57948",
    "notification_config_id": 37}
```

### 3.6.2 Mail event notifications

Detection of mail based on a mail attachment

```
{"impact": 100,
"file_detail_link": "https://user.enterprise.lastline.local/malscape/\#/task/613
    ↪ de0cc17534adbb0f046b88e1f70f7",
"start_timestamp": "2015−08−27 14:16:06+00:00",
"sender": "fake@example.com",
"description": "Suspicious Email Attachment",
"format_version": "7.5",
"recipients": ["<test@example.com>"],
"file_type": "Rich Text Format data, unknown version",
"file_name": "f0b3f8277c884d4be2397bb05cd102f3",
"file_sha1": "b4be2633ac9ca6ff6670d67473b042123a0a7644",
"subject": "Test",
"file_md5": "f0b3f8277c884d4be2397bb05cd102f3",
"detection_type": "email−attachment",
"file_size": 163699,
"device_id": "3053322414:602745899",
"end_timestamp": "2015−08−27 14:16:06+00:00",
"event_detail_link": "https://user.enterprise.lastline.local/mail/message
    ↪ \#/3287884757/3459119816/9561?mail_time=2016−03−21"}
```

Detection of mail based on a mail url

```
{"end_timestamp": "2015−11−25 14:28:05+00:00",
"impact": 99,
"start_timestamp": "2015−11−25 14:28:05+00:00",
"sender": "test@lastline.com",
"description": "Suspicious Email Url",
"format_version": "7.5",
"recipients": ["fake@lastline.com"],
"mail_url_md5": "2be456f055282b7dc6d6b0f002a52dad",
"detection_type": "email−url",
"device_id": "3287884757:3459119816",
"appliance_name": "sensor01",
"mail_url": "http://www.evil.fake",
"subject": "TEST EMAIL!",
"event_detail_link": "https://user.enterprise.lastline.local/mail/message
    ↪ \#/3287884757/3459119816/9561?mail_time=2016−03−21"}
```

Detection of mail based on a mail message

```
{"end_timestamp": "2019-09-09 22:17:17+00:00",
"impact": 80,
"start_timestamp": "2019-09-09 22:17:17+00:00",
"sender": "test@lastline.com",
"description": "Suspicious Email Message",
"format_version": "9.1",
"recipients": ["fake@lastline.com"],
"detectors": ["email\_anomaly:spam\_domain", "email\_anomaly:spam\_ip"],
"threat": "Mebroot",
"threat_class": "drive-by",
"detection_type": "email-message",
"device_id": "3287884757:3459119816",
"appliance_name": "sensor01",
"subject": "TEST EMAIL!",
"event_detail_link": "https://user.enterprise.lastline.local/mail/message
    ↪ \#/3287884757/3459119816/9359?date=2019-09-09"}
```

### 3.6.3 Appliance event

Notification reporting that an appliance is online

```
{"impact": 10,
"appliance_detail_link": "https://user.enterprise.lastline.local/appliance\#/config/
    ↪ status/0284f6fcf42f4e859499f00bc00c19a7",
"format_version": "7.5",
"appliance_type": "SENSOR",
"trigger_type": "appliance-checkin",
"timestamp": "2015-08-27 13:34:14",
"appliance_fqdn": "lastline-sensor.lastline.local",
"last_checkin_timestamp": "2015-08-27 13:34:14",
"is_online": true,
"appliance_public_ip": "192.168.1.57",
"appliance_private_ip": "192.168.1.57",
"appliance_uuid": "0284f6fcf42f4e859499f00bc00c19a7"}
```

Notification reporting the successful upload of email metadata

```
{"impact": 10,
"detail_name": "Email metadata uploader",
"appliance_detail_link": "https://user.enterprise.lastline.local/appliance\#/config/
    ↪ status/0284f6fcf42f4e859499f00bc00c19a7",
"format_version": "7.5",
"appliance_type": "SENSOR",
"trigger_type": "appliance-message",
"timestamp": "2015-08-27 13:46:36",
"source": "llmail",
"appliance_uuid": "0284f6fcf42f4e859499f00bc00c19a7",
"key": "sharduploader.upload",
"appliance_fqdn": "lastline-sensor.lastline.local",
"appliance_public_ip": "192.168.1.57",
"appliance_private_ip": "192.168.1.57",
"message": "Successful upload of email metadata",
"component_name": "Email Analysis Service"}
```

### 3.6.4 Audit event

Notification reporting that the software version of an appliance has been upgraded

```
{"affected_entity_id": "aaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaa",
"customer": "test@fake.bet",
"account": "fake@test.bet",
"description": "The software version of the appliance has been upgraded",
"format_version": "7.5",
"configured_software_version": "2.2.2",
"impact": 40,
"timestamp": "2015-11-25 14:25:45+00:00",
"source_ip": "192.168.0.1",
"event_type": "audit-event",
"audit_action_type": "appliance_upgraded",
"event_detail_link": "https://user.enterprise.lastline.local/settings\#/audit/a
   ↪ /2015-11-24/2015-11-26?audit_event_id=17",
"affected_entity_type": "appliance",
"audit_event_id": 17,
"audit_event_category": "configuration"}
```

### 3.6.5 Network event

Detection of a malicious file download

```
{"file_detail_link": "https://user.enterprise.lastline.local/malscape/\#/task/6
   ↪ ad71b9ddc554d1eac73ce27f55e2abb",
"file_type": "PDF document",
"file_name": "/5e2eceec69c9ef5435298abc1d10624b.pdf",
"file_size": 5984,
"detection_type": "file-download",
"occurrences": 1,
"detection_id": "2535ec71:30fbe7df:e52cff2b",
"end_timestamp": "2015-08-27 13:46:13+00:00",
"transport_protocol": "TCP",
"malware": "Malicious Document Download",
"event_id": 9,
"src_ip": "127.0.0.1",
"event_detail_link": "https://user.enterprise.lastline.local/event
   ↪ \#/3053322414/602745899/9?event_time=2015-08-27",
"impact": 100,
"description": "Suspicious File Download",
"format_version": "7.5",
"file_md5": "5e2eceec69c9ef5435298abc1d10624b",
"http_host": "127.0.0.2",
"device_id": "3053322414:602745899",
"event_url": "http://127.0.0.2/5e2eceec69c9ef5435298abc1d10624b.pdf",
"incident_id": 12,
"incident_impact": 100,
"incident_malware": "Malicious Document Download",
"incident_malware_class": "Malicious File Download",
"start_timestamp": "2015-08-27 13:46:13+00:00",
"malware_class": "Malicious File Download",
"file_sha1": "e1a1dcfefa8c96723d5f7816f0e991a0a01b5f0a",
"dst_port": 80,
"action": "LOG",
"dst_ip": "127.0.0.2"}
```

Detection of a suspicious network connection

```
{"impact": 1,
"transport_protocol": "TCP",
"malware": "Lastline test",
"description": "Suspicious Network Connection",
"format_version": "7.5",
"event_id": 8,
"dst_port": 80,
"start_timestamp": "2015-08-27 13:38:44+00:00",
"dst_host": "test.lastline.com",
"src_ip": "192.168.1.57",
"detection_type": "network-connection",
"malware_class": "Lastline test",
"occurrences": 1,
"event_detail_link": "https://user.enterprise.lastline.local/event
   ↪ \#/3053322414/602745899/8?event_time=2015-08-27",
"detection_id": "fc900ff8:30fbe7df:30fbe7df",
"action": "LOG",
"dst_ip": "52.5.237.96",
"device_id": "3053322414:602745899",
"event_url": "http://test.lastline.com",
"incident_id": 13,
"incident_impact": 1,
"incident_malware": "Lastline test",
"incident_malware_class": "Lastline test",
"src_mac": "08:00:27:00:c9:7a",
"end_timestamp": "2015-08-27 13:38:44+00:00"}
```

Suspicious dns resolution

```
{"impact": 1,
"transport_protocol": "UDP",
"malware": "Lastline test",
"resolved_domain": "test.lastline.com",
"description": "Suspicious DNS Resolution",
"format_version": "7.5",
"event_id": 7,
"dst_port": 53,
"start_timestamp": "2015-08-27 13:38:44+00:00",
"src_ip": "192.168.1.57",
"detection_type": "dns-resolution",
"malware_class": "Lastline test",
"occurrences": 2,
"event_detail_link": "https://user.enterprise.lastline.local/event
    ↪ \#/3053322414/602745899/7?event_time=2015-08-27",
"detection_id": "fc900ff8:30fbe7df:30fbe7df",
"action": "LOG",
"dst_ip": "192.168.1.1",
"device_id": "3053322414:602745899",
"event_url": "http://test.lastline.com",
"incident_id": 14,
"incident_impact": 1,
"incident_malware": "Lastline test",
"incident_malware_class": "Lastline test",
"src_mac": "08:00:27:00:c9:7a",
"end_timestamp": "2015-08-27 13:38:44+00:00"}
```

Network event contaning information about the related pcap

```
{"event_url": "http://example.com",
"detection_type": "dns-resolution",
"occurrences": 1,
"detection_id": "c90de0dd:d0051f96:d0051f96",
"appliance_name": "sensor01",
"impact": 70,
"malware": "Test Threat",
"src_dns_domain": "",
"format_version": "7.2",
"event_id": 1785,
"src_ip": "192.168.0.1",
"event_detail_link": "https://do.no.connect/event\#/3287884757/3459119816/1785?
    ↪ event_time=2012-12-12",
"end_timestamp": "2012-12-12 00:20:00+00:00",
"transport_protocol": "TCP",
"description": "Suspicious DNS Resolution",
"dst_ip": "10.0.0.1",
"device_id": "3287884757:3459119816",
"start_timestamp": "2012-12-12 00:00:00+00:00",
"malware_class": "Testing Threat Class",
"dst_port": 80,
"action": "LOG",
"pcap_id": 866,
"pcap_src_ip": "192.168.0.1",
"pcap_threats": ["UserDefinedThreat"],
"pcap_dst_port": 80,
"pcap_failed_connections": 1,
"pcap_in_bytes": 1,
"pcap_start_time": "2012-12-12 00:00:00",
"pcap_src_port": 23456,
"pcap_protocols": ["TCP"],
"pcap_urls": ["http://example.com"],
"pcap_hosts": ["www.lastline.com"],
"pcap_out_bytes": 1,
"pcap_dst_ip": "10.0.0.1",
"pcap_successful_connections": 1,
"pcap_body": "1MOyoQIABAAAAAAAAAAAAAP//AAABAAAAI0ujQLi/BAA+AAAAPgAAAP7/
    ↪ IAABAAAAAQAAAAgARQAAMA9BQACABpHrkf6g7UHQ5N8NLABQOK",}
```

### 3.6.6 Intrusion event

Example of a notification triggered for an intrusion

```
    {"hosts_affected": [
        {
            "host": "1.2.3.4",
            "attack_stages": ["Command and Control"],
            "malware": ["Upatre Public IP Check"]
        }
    ],
    "correlation_rule": "C&C Rule",
    "device_id": "3287884757:3459119816",
    "device_id": "3287884757:3459119816",
    "end_timestamp": "2018-02-01 15:16:17",
    "format_version": "\onpremiseVersion{}",
    "impact": 90,
    "intrusion_details_link": "https://do.no.connect/portal#/campaigns/details/
    d5ec0e2e01cb49d993a0c4d7dbee968c?customer=mannimarco@oblivion.bet",
    "intrusion_name": "intrusion",
    "intrusion_uuid": "d5ec0e2e01cb49d993a0c4d7dbee968c",
    "last_modified": "2018-01-12 03:15:20",
    "most_advanced_stage": "Command and Control",
    "nr_affected_hosts": 1,
    "nr_malware": 1,
    "reason": "Detected Command&Control traffic indicating that 2 hosts are infected with
       ↪ malware Upatre Public IP Check",
    "start_timestamp": "2018-01-07 20:01:02",
    "trigger_type": "intrusion-event",
    "extended_description": "Added detection information: hosts: 1.2.3.4; malware: Upatre
       ↪ Public IP Check",}
```