



eStreamer eNcore Operations Guide v3.0

First Published: June 1, 2017

Last Updated: August 25, 2017

Table of Contents

Table of Contents.....	2
About This eStreamer eNcore Operations Guide v3.0	4
Revision History	4
Conventions	4
1 Introduction	6
1.1 Document Purpose	6
1.2 Background	6
1.3 Application Summary.....	6
1.3.1 eStreamer-eNcore CLI.....	6
1.3.2 Cisco eStreamer eNcore for Splunk (TA-eStreamer)	6
1.3.3 Cisco eStreamer eNcore Dashboard for Splunk (eStreamer Dashboard).....	7
2 Pre-requisites.....	7
2.1 Installation (CLI only)	7
2.1.1 Python 2.7 Installation	8
2.1.2 pyOpenSSL	8
2.1.3 EPEL Repo Dependency for RHEL.....	8
2.1.4 Windows	8
3 Operation: Cisco eStreamer eNcore for Splunk.....	8
3.1 Installation	8
3.2 Configuration	9
3.3 Execution.....	10
3.4 Troubleshooting.....	10
4 Operation: eStreamer eNcore CLI.....	10
4.1 Installation	10
4.1.1 Download eStreamer-eNcore-cli-X.YY.tar.gz	10
4.1.2 Extract Files	10
4.1.3 Create (or copy existing) PKCS12 file	11
4.1.4 Install the PKCS12 File.....	11
4.1.5 Test.....	11
4.1.6 Run	13

4.1.7 Finding Your Data..... **Error! Bookmark not defined.**

By default, eNcore outputs Splunk compatible key-value pair text files to a relative subdirectory **data/splunk**. This is easily changed by editing the configuration file. **Error! Bookmark not defined.**

```
sbs20@centos:~/eStreamer_eNcore-0.15
[sbs20@centos eStreamer_eNcore-0.15]$ head -n 5 ./data/splunk/encore.log1493225870
has_ipv6=1 event_type=1001 legacy_ip_address=0.0.0.0 event_desc="Additional MAC Detected" ttl=
54 primary=0 event_usec=19594 rec_type=28 event_subtype=14 rec_type_simple=RNA rec_type_desc="
Additional MAC Detected for Host" mac_address=0:0:0:0:0:0 additional_mac_address=0:1:db:1c:c7:
be event_sec=1476351188 sensor=Sensor188 last_seen=1476350581
has_ipv6=1 event_type=1001 legacy_ip_address=0.0.0.0 event_desc="Additional MAC Detected" ttl=
41 primary=0 event_usec=20603 rec_type=28 event_subtype=14 rec_type_simple=RNA rec_type_desc="
Additional MAC Detected for Host" mac_address=0:0:0:0:0:0 additional_mac_address=0:60:a1:3b:86
:9 event_sec=1476351188 sensor=Sensor188 last_seen=1476350571
has_ipv6=1 event_type=1001 legacy_ip_address=0.0.0.0 event_desc="Additional MAC Detected" ttl=
64 primary=0 event_usec=18921 rec_type=28 event_subtype=14 rec_type_simple=RNA rec_type_desc="
Additional MAC Detected for Host" mac_address=0:0:0:0:0:0 additional_mac_address=0:7:cf:2d:1b:
3e event_sec=1476351188 sensor=Sensor188 last_seen=1476348954
has_ipv6=1 event_type=1001 legacy_ip_address=0.0.0.0 event_desc="Additional MAC Detected" ttl=
64 primary=0 event_usec=18921 rec_type=28 event_subtype=14 rec_type_simple=RNA rec_type_desc="
Additional MAC Detected for Host" mac_address=0:0:0:0:0:0 additional_mac_address=d8:5d:4c:57:1
b:95 event_sec=1476351188 sensor=Sensor188 last_seen=1476350588
has_ipv6=1 event_type=1001 legacy_ip_address=0.0.0.0 event_desc="Additional MAC Detected" ttl=
47 primary=0 event_usec=20022 rec_type=28 event_subtype=14 rec_type_simple=RNA rec_type_desc="
Additional MAC Detected for Host" mac_address=0:0:0:0:0:0 additional_mac_address=0:1:db:1c:c7:
be event_sec=1476351188 sensor=Sensor188 last_seen=1476350576
[sbs20@centos eStreamer_eNcore-0.15]$
```

..... **Error!**

Bookmark not defined.

4.2 Configuration Options..... 14

 4.2.1 Essential Configuration 14

 4.2.2 Advanced Configuration Options..... 16

4.3 Execution..... 18

4.4 Logging 19

5 Troubleshooting and questions 20

 5.1 Error messages..... 20

 5.2 Frequently Asked Questions 20

6 Cisco Support 21

7 Appendix A:..... 21

 7.1 FMC eStreamer Certificate Creation..... 21

 7.2 Example Configuration File 23

Trademarks and Disclaimers..... 25

About This eStreamer eNCore Operations Guide v3.0

Author	Sam Strachan (sastrach)
Change Authority	Cisco Systems Advanced Services, Security & Collaboration IDT, Implementation Americas
Content ID	585637
Project ID	852716

Revision History

Revision	Date	Name or User ID	Comments
1.0	06/01/2017	Michelle Jenkins	Initial Release
3.0	08/25/2017	Sam Strachan	

Conventions

This document uses the following conventions.

Convention	Indication
bold font	Commands and keywords and user-entered text appear in bold font .
<i>italic font</i>	Document titles, new or emphasized terms, and arguments for which you supply values are in <i>italic font</i> .
[]	Elements in square brackets are optional.
{x y z}	Required alternative keywords are grouped in braces and separated by vertical bars.
[x y z]	Optional alternative keywords are grouped in brackets and separated by vertical bars.
String	A non-quoted set of characters. Do not use quotation marks around the string or the string will include the quotation marks.
<code>courier font</code>	Terminal sessions and information the system displays appear in <code>courier font</code> .
< >	Nonprinting characters such as passwords are in angle brackets.
[]	Default responses to system prompts are in square brackets.
!, #	An exclamation point (!) or a pound sign (#) at the beginning of a line of code indicates a comment line.

Note: Means *reader take note*. Notes contain helpful suggestions or references to material not covered in the manual.

Caution: Means *reader be careful*. In this situation, you might perform an action that could result in equipment damage or loss of data.

Warning: IMPORTANT SAFETY INSTRUCTIONS

Means danger. You are in a situation that could cause bodily injury. Before you work on any equipment, be aware of the hazards involved with electrical circuitry and be familiar with standard practices for preventing accidents. Use the statement number provided at the end of each warning to locate its translation in the translated safety warnings that accompanied this device.

SAVE THESE INSTRUCTIONS

Regulatory: Provided for additional information and to comply with regulatory and customer requirements.

1 Introduction

1.1 Document Purpose

This document seeks to outline the background and usage of the eStreamer eNcore client in order to assist users with installation and execution.

1.2 Background

The Cisco Event Streamer (i.e. eStreamer) allows users to stream system intrusion, discovery, and connection data from Firepower Management Center or managed device (i.e., the eStreamer server) to external client applications. eStreamer responds to client requests with terse, compact, binary encoded messages that facilitate high performance.

Historically, the eStreamer SDK has been wrapped with some additional code to create separate perl applications (e.g., the Cisco eStreamer for Splunk app and the CEF agent).

eStreamer eNcore is a completely new, multi-platform, multi-process Python application that is compatible with FMC versions 6.0 and above.

1.3 Application Summary

eNcore is an all-purpose client, which requests all possible events from eStreamer, parses the binary content, and outputs events in various formats to support other SIEMs. eNcore was built from scratch in Python with a scalable and fast multi-process architecture. It supports version 6.0 of Firepower Management Center. It was built and tested on CentOS 7, but should work with any Linux distribution that supports the pre-requisites. The software will run on Windows, although, it has not been made production-ready yet.

There are three packages associated with eStreamer eNcore.

1.3.1 eStreamer-eNcore CLI

A command line interface for eStreamer eNcore. It runs standalone to request data from the FMC eStreamer server and output its data. The output data format can be:

- key-value pairs designed to maintain compatibility with previous Splunk collectors
- JSON
- CEF for Arcsight which maintains backwards compatibility with the previous cef-agent.

The output can be streamed to files, a TCP or UDP network port, stdout.

1.3.2 Cisco eStreamer eNcore for Splunk (TA-eStreamer)

A Splunk technical add-on that contains: the core eNcore client code as well as:

- A simple set-up screen for configuration
- Data inputs (inputs.conf) for data, logs and status
- Parsing hints (props.conf)
- Extension which allows eNcore to live and die with Splunk

Warning: Windows is not currently supported for data collection. Further, the Splunk TA is not designed to be run from the command line.

1.3.3 Cisco eStreamer eNcore Dashboard for Splunk (eStreamer Dashboard)

An app that includes the same user interface elements as the old Cisco eStreamer for Splunk (<https://splunkbase.splunk.com/app/1629/>). The app contains no code or collector elements, however. It is simply a UI add-on with some pre-defined searches, macros, eventtypes and workflow actions.

2 Pre-requisites

Note: If you are intending to run Cisco eStreamer eNcore for Splunk then provided you have the default installation of Splunk itself, including Python 2.7 and openssl, no further action is required.

If you are intending to run the Splunk collector then provided you have the default installation of Splunk itself, including Python 2.7 and openssl, no further action is required.

If you plan to run the CLI version of eNcore then you must have a version of Python 2.7 installed. You must also have a means of splitting the FMC's PKCS12 file. The default approach is to install pyOpenSSL and let eNcore do the work for you.

Note: The `encore.sh` script should guide you through all these points if you wish to get going immediately, but it is worth being familiar with these points prior to install.

To check whether Python2.7 is present, use following command:

```
which python
```

To test where Python2.7 is present, use the following command.

```
whereis python
```

Note: If you are installing the CLI version on a device running Splunk, then it is worth noting that Splunk has its own version of Python. The Splunk Python has been compiled differently from the normal distribution – specifically, it is built with PyUnicodeUCS2. The `encore.sh` script will detect this and warn you. If you encounter this problem, then you will need to create a new user and run eStreamer-eNcore as that user. You should consider running the Splunk add on instead.

To check for pyOpenSSL, use the following command:

```
pip list | grep -i pyOpenSSL
```

2.1 Installation (CLI only)

If you are installing the add-on for Splunk, you can ignore this section.

2.1.1 Python 2.7 Installation

Use the following command to install Python on CentOS:

```
sudo yum install python
```

2.1.2 pyOpenSSL

Install pyOpenSSL as follows:

```
sudo yum install python-pip python-devel openssl-devel gcc
sudo pip install pyOpenSSL
```

2.1.3 EPEL Repo Dependency for RHEL

If you are having problems installing these packages, then you may need to enable the EPEL repository. At time of writing the following commands were helpful:

```
wget http://dl.fedoraproject.org/pub/epel/7/x86\_64/e/epel-release-7-9.noarch.rpm
sudo rpm -ivh epel-release-7-9.noarch.rpm
```

If you are running on Fedora and continue to have problems running `pip install pyOpenSSL`, such as `G++ error:/usr/lib/rpm/redhat/redhat-hardened-cc1: No such file or directory` then try:

```
sudo dnf install redhat-rpm-config
```

2.1.4 Windows

Warning: Windows is not yet supported for production execution. If, however, you wish to attempt an install for the CLI version, then you will need to run the following commands.

```
pip install pyOpenSSL
pip install win-inet-pton
```

3 Operation: Cisco eStreamer eNcore for Splunk

3.1 Installation

Note: Data collection is not supported in Windows

Download from <http://apps.splunk.com/app/3662> or navigate to Splunkbase, search for “Cisco eStreamer eNcore Collector for Splunk”, accept the terms and conditions, and install.

You must have a valid PKCS12 file for your Splunk server. You may re-use an existing PKCS12 key pair from any previous Cisco eStreamer for Splunk installation. For more information on creating a PKCS12 file see Appendix A.

Once you have the PKCS12 file you must rename the file to “client.pkcs12” and place it on the Splunk server here:

```
$SPLUNK_HOME/etc/apps/TA-eStreamer/bin/encore/client.pkcs12
```

This will require some form of SSH, SCP or console access to the server.

3.2 Configuration

Navigate to app settings in Splunk – from the home page, click the “cog” icon



Find **Cisco eStreamer eNcore for Splunk** and click “Set-up”

Splunk Add-on for Cisco FireSIGHT	Splunk_TA_sourcefire	3.3.2	Yes	No	Global Permissions	Enabled Disable	Edit properties View objects View details on SplunkApps
Cisco eStreamer eNcore for Splunk	TA-eStreamer	2.9.1	Yes	No	Global Permissions	Enabled Disable	Set up Edit properties View objects View details on SplunkApps
Log Event Alert Action	alert_logevent	6.5.1	Yes	No	App Permissions	Enabled Disable	Edit properties View objects

At a minimum:

- enter the “FMC hostname or IP address” and
- check the “Process PKCS12 file?”. Optionally enter a password here

Note: Each time you load this page, “Process PKCS12 file” is reset to “no” and the password is not saved. It should be used once to process the PKCS12 file using openssl and store a public-private key pair.

Check the data you wish to collect. Note that there are no options to turn off intrusion, policy or malware events.

Data

- Packets? Packet logs can be large and use up storage
- Connections? This is a very high-volume option and may consume significant network and storage usage
- Metadata? Metadata logs are not event-driven but can prove informative

Now enable the data inputs in Splunk.

Navigate to **Settings > Data Inputs > Files & Directories** and enable the single TA-eStreamer app input (cisco:estreamer:data) – this is the where the main output data files are saved

Navigate to **Settings > Data Inputs > Scripts** and enable the three TA-eStreamer inputs

- cisco:estreamer:clean – this script has no output but is used to delete data files older than 12 hours

- `cisco:estreamer:log` – this script uses the stdout of eNcore to take program log data. This becomes very useful where things are not going to plan
- `cisco:estreamer:status` – this script runs periodically to maintain a clear status of whether the program is running or not

3.3 Execution

Once you have fully configured the collector and enabled the inputs, navigate back to the set-up page in app settings, enable eNcore ("is enabled?") and press save.

To check the status, search for `sourcetype="cisco:estreamer:status"`

To check more detailed log output, search for `sourcetype="cisco:estreamer:log"`

To look for eStreamer data, search for `sourcetype="cisco:estreamer:data"`

For further analysis of the outputs consider installing either:

- Cisco eStreamer eNcore Dashboard for Splunk
- Splunk Add-on for Cisco FireSIGHT

Please note that at time of writing **Splunk Add-on for Cisco FireSIGHT** searches for "cisco:sourcefire" events, therefore you will need to apply some kind of renaming or adjust the sourcetype values so they match. We would recommend navigating to Settings > Fields > Sourcetype renaming and change **from** `sourcetype="cisco:estreamer:data"` to `sourcetype="cisco:sourcefire"`

3.4 Troubleshooting

If you see **Error while posting to url=/servicesNS/nobody/TA-eStreamer/encore/configure/main** when you press 'Save' in the setup screen, then please search the logs for more information: Search: `index=_internal source="*splunkd.log" AdminManagerExternal`

If you are getting less data than you are expecting or just want to see what the eStreamer client is doing, then search: `sourcetype="cisco:estreamer:log" (ERROR OR WARNING)`. To see more detail, remove the ERROR and WARNING constraints.

4 Operation: eStreamer eNcore CLI

4.1 Installation

4.1.1 Download eStreamer-eNcore-cli-X.YY.tar.gz

Use the following command to copy the file from your local machine to the target device:

```
scp /path/to/eStreamer-eNcore-cli-X.YY.tar.gz user@host:/path/in/device
```

4.1.2 Extract Files

```
tar -xf eStreamer-eNcore-X.YY.tar.gz
```

4 Operation: eStreamer eNcore CLI

4.1.3 Create (or copy existing) PKCS12 file

See appendix for instructions.

4.1.4 Install the PKCS12 File

```
scp /path/host.pkcs12 user@host:/path/eStreamer_eNcore/client.pkcs12
```

4.1.5 Test

Change the working directory to eStreamer-eNcore-X.YY using the following command:

```
cd eStreamer-eNcore
```

Then, run the encore shell script – you will be guided through any additional configuration:

```
./encore.sh test
```

The script will verify that you have the pre-requisites installed, notably:

- Python 2.7
- the correct build of Python
- pyOpenSSL
- a client.pkcs12 file
- a valid host
- It will prompt you to choose whether to output data for Splunk, CEF or JSON

If there are any missing items, you will be presented with an explanation. An example explanation is in the following figure.

Figure 1. Choosing your output

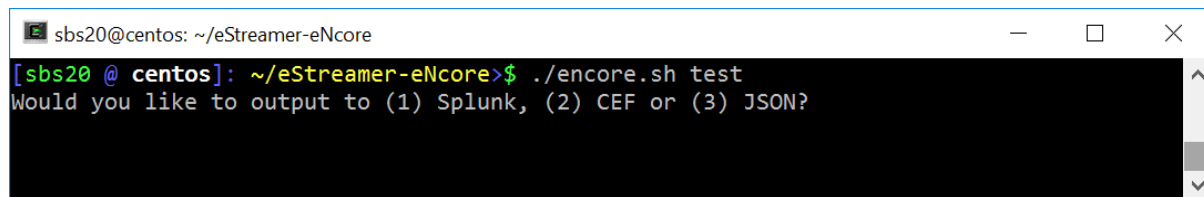
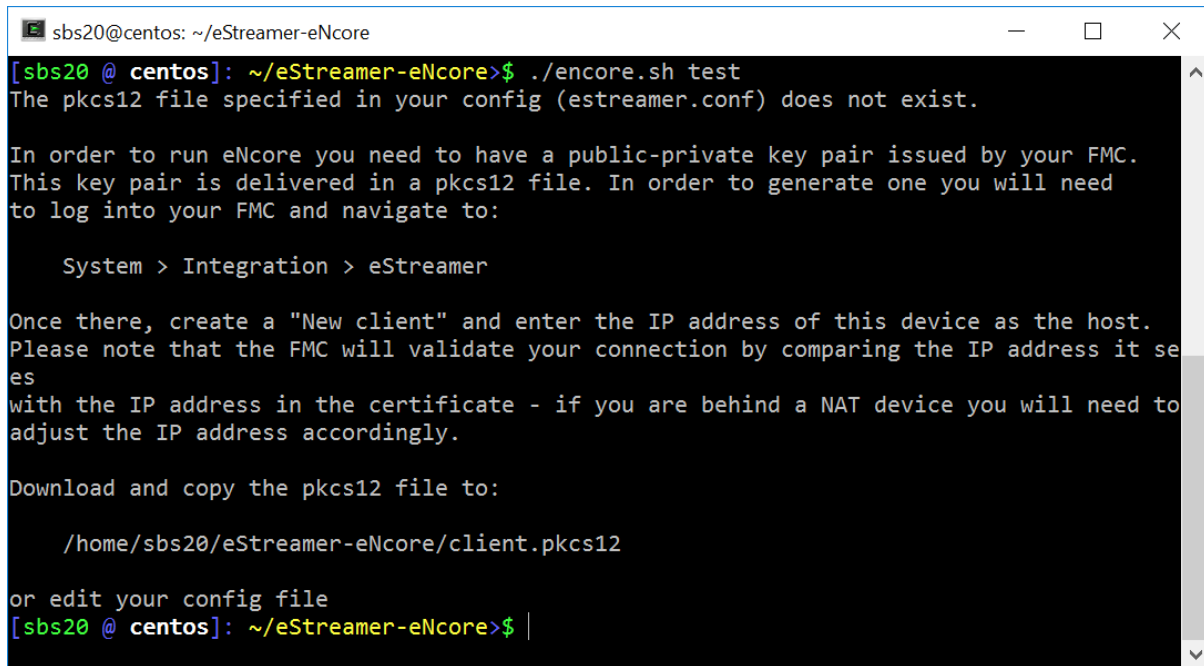


Figure 2: Missing pkcs12 File



```
sbs20@centos: ~/eStreamer-eNcore
[sbs20 @ centos]: ~/eStreamer-eNcore>$ ./encore.sh test
The pkcs12 file specified in your config (estreamer.conf) does not exist.

In order to run eNcore you need to have a public-private key pair issued by your FMC.
This key pair is delivered in a pkcs12 file. In order to generate one you will need
to log into your FMC and navigate to:

    System > Integration > eStreamer

Once there, create a "New client" and enter the IP address of this device as the host.
Please note that the FMC will validate your connection by comparing the IP address it sees
with the IP address in the certificate - if you are behind a NAT device you will need to
adjust the IP address accordingly.

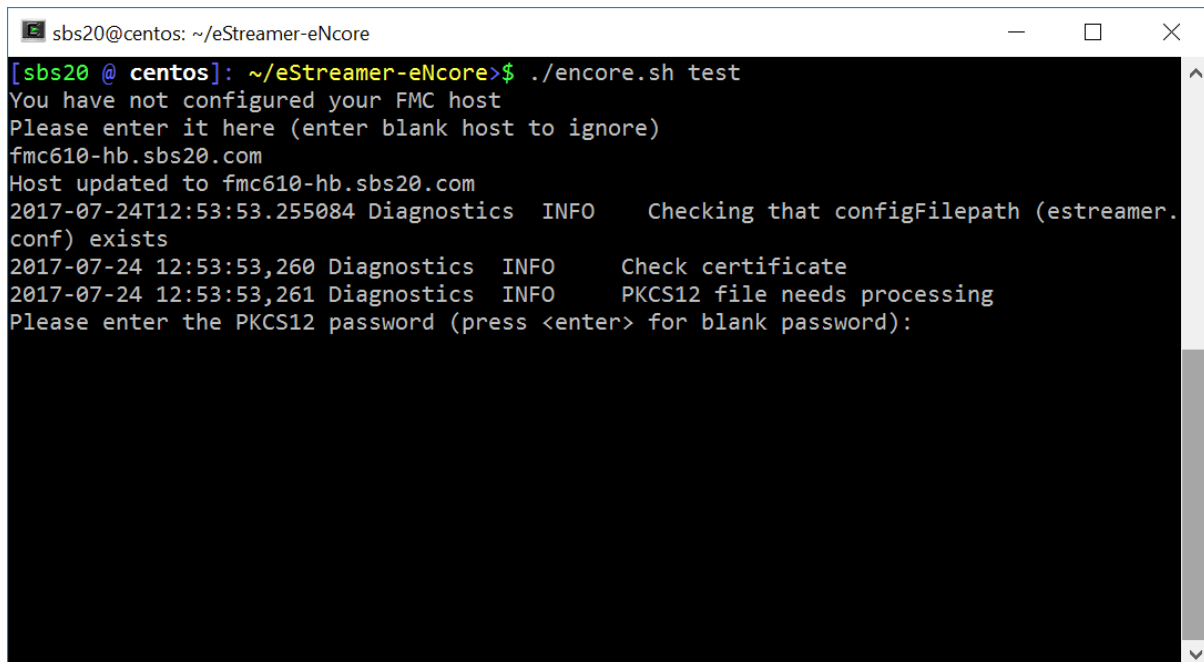
Download and copy the pkcs12 file to:

    /home/sbs20/eStreamer-eNcore/client.pkcs12

or edit your config file
[sbs20 @ centos]: ~/eStreamer-eNcore>$ |
```

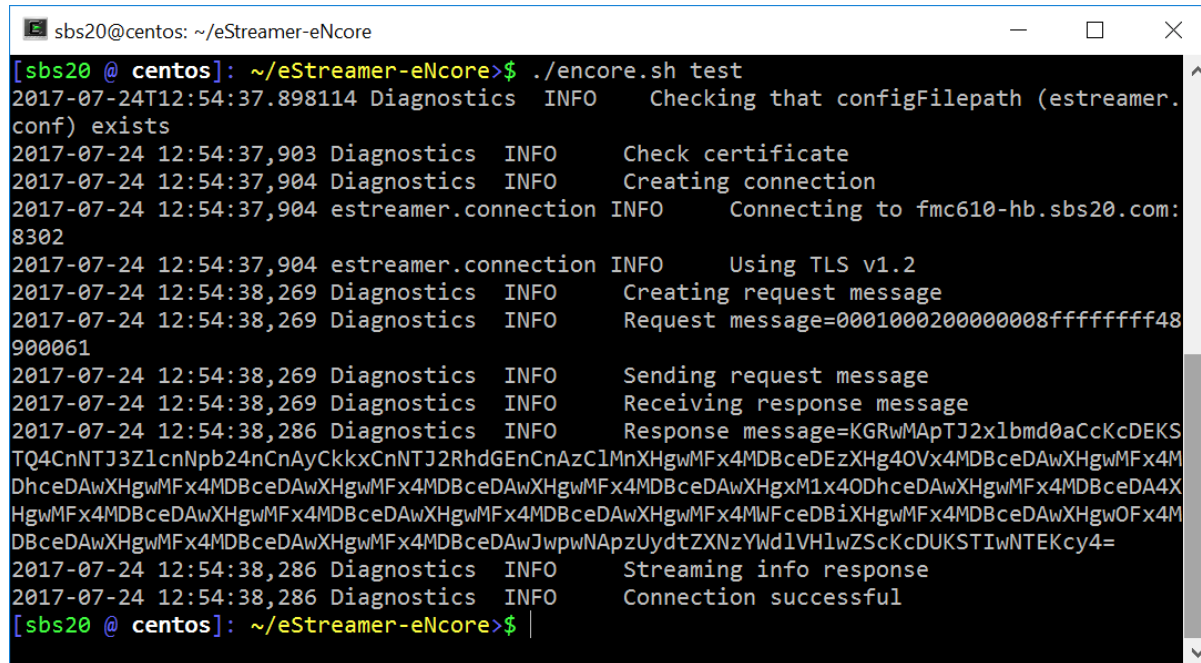
You will then be prompted to enter the IP / FQDN of the FMC and the PKCS12 file password.

Figure 3: Enter Password



```
sbs20@centos: ~/eStreamer-eNcore
[sbs20 @ centos]: ~/eStreamer-eNcore>$ ./encore.sh test
You have not configured your FMC host
Please enter it here (enter blank host to ignore)
fmc610-hb.sbs20.com
Host updated to fmc610-hb.sbs20.com
2017-07-24T12:53:53.255084 Diagnostics INFO    Checking that configFilepath (estreamer.
conf) exists
2017-07-24 12:53:53,260 Diagnostics INFO    Check certificate
2017-07-24 12:53:53,261 Diagnostics INFO    PKCS12 file needs processing
Please enter the PKCS12 password (press <enter> for blank password):
```

Figure 4: Successful Test

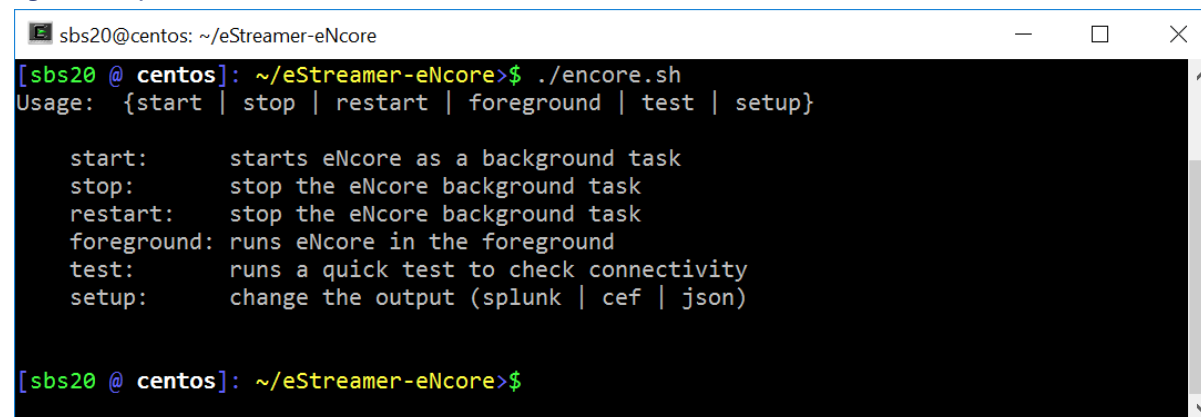


```
sbs20@centos: ~/eStreamer-eNcore
[sbs20 @ centos]: ~/eStreamer-eNcore>$ ./encore.sh test
2017-07-24T12:54:37.898114 Diagnostics INFO    Checking that configFilepath (estreamer.
conf) exists
2017-07-24 12:54:37,903 Diagnostics INFO    Check certificate
2017-07-24 12:54:37,904 Diagnostics INFO    Creating connection
2017-07-24 12:54:37,904 estreamer.connection INFO    Connecting to fmc610-hb.sbs20.com:
8302
2017-07-24 12:54:37,904 estreamer.connection INFO    Using TLS v1.2
2017-07-24 12:54:38,269 Diagnostics INFO    Creating request message
2017-07-24 12:54:38,269 Diagnostics INFO    Request message=000100020000008ffffff48
900061
2017-07-24 12:54:38,269 Diagnostics INFO    Sending request message
2017-07-24 12:54:38,269 Diagnostics INFO    Receiving response message
2017-07-24 12:54:38,286 Diagnostics INFO    Response message=KGRwMApTJ2x1bmd0aCcKcDEKS
TQ4CnNTJ3Z1cnNpb24nCnAyCkxkxNNTJ2RhdGEnCnAzClMnXHgwMFx4MDBceDEzXHg4OVx4MDBceDAwXHgwMFx4M
DhceDAwXHgwMFx4MDBceDAwXHgwMFx4MDBceDAwXHgwMFx4MDBceDAwXHgxM1x4ODhceDAwXHgwMFx4MDBceDA4X
HgwMFx4MDBceDAwXHgwMFx4MDBceDAwXHgwMFx4MDBceDAwXHgwMFx4MWFceDBiXHgwMFx4MDBceDAwXHgwOFx4M
DBceDAwXHgwMFx4MDBceDAwXHgwMFx4MDBceDAwJwpwNApZUydtZXNzYWdlVHlwZScKcDUKSTiWNTEKcy4=
2017-07-24 12:54:38,286 Diagnostics INFO    Streaming info response
2017-07-24 12:54:38,286 Diagnostics INFO    Connection successful
[sbs20 @ centos]: ~/eStreamer-eNcore>$ |
```

4.1.6 Run

If you run `encore.sh` without any parameters, you will be presented with brief instructions.

Figure 5: Help Screen



```
sbs20@centos: ~/eStreamer-eNcore
[sbs20 @ centos]: ~/eStreamer-eNcore>$ ./encore.sh
Usage: {start | stop | restart | foreground | test | setup}

start:      starts eNcore as a background task
stop:       stop the eNcore background task
restart:    stop the eNcore background task
foreground: runs eNcore in the foreground
test:      runs a quick test to check connectivity
setup:     change the output (splunk | cef | json)

[sbs20 @ centos]: ~/eStreamer-eNcore>$
```

For your first run, it is recommended to run it in the foreground so you can see what is happening. Every two minutes, the screen will update with a note of how many records have been processed. If you wish to change the update frequency, then see the `monitor.period` configuration setting.

Figure 6: Running in the Foreground with Monitor Status

```

sbs20@centos: ~/eStreamer-eNcore
2017-07-24 13:03:03,316 estreamer.bookmark INFO      Bookmark file /home/sbs20/eStreamer-
eNcore/fmc610-hb.sbs20.com-8302_bookmark.dat does not exist.
2017-07-24 13:03:03,316 estreamer.handler INFO      Starting Handler.
2017-07-24 13:03:03,336 estreamer.bookmark INFO      Bookmark file /home/sbs20/eStreamer-
eNcore/fmc610-hb.sbs20.com-8302_bookmark.dat does not exist.
2017-07-24 13:03:03,337 estreamer.settings.settings INFO      Timestamp: Start = 2 (Bookm
ark = 0)
2017-07-24 13:03:03,337 estreamer.subscriber INFO      EventStreamRequestMessage: 0001000
2000000080000000048900061
2017-07-24 13:03:03,357 estreamer.bookmark INFO      Bookmark file /home/sbs20/eStreamer-
eNcore/fmc610-hb.sbs20.com-8302_bookmark.dat does not exist.
2017-07-24 13:03:03,358 estreamer.settings.settings INFO      Timestamp: Start = 2 (Bookm
ark = 0)
2017-07-24 13:03:03,358 estreamer.subscriber INFO      StreamingRequestMessage: 000108010
000003800001a0b000000384890006100000000009000c000400150009001f000b003d000e000470004005b0
00700650006006f0002008300000000
2017-07-24 13:03:04,393 estreamer.metadata.cache WARNING Metadata key ('uuid') missing
on object ({'recordType': 119, 'blockLength': 8, 'checksum': 0, 'recordLength': 8, 'arch
iveTimestamp': 0, 'blockType': 15}). Ignoring
2017-07-24 13:05:03,412 estreamer.monitor INFO      Running. 163730 subscribed; 163211 ha
ndled;

```

Note: To stop the foreground process, press ctrl-c.

4.2 Configuration Options

4.2.1 Essential Configuration

The default configuration file is set up to run out of the box. Following is a brief explanation of each setting in case you wish to customize.

4.2.1.1 Subscription Server

This is the FMC host and associated information. If you encounter TLS difficulties and are willing to downgrade, then you can change `tlsVersion` to 1.0.

Note: Note that downgrading the TLS version is useful for debugging and seeing the software work but it is not a recommended long-term strategy. It is recommended instead to fix the root cause.

Figure 8: Subscription Server Screen

```

"subscription": {
  "servers": [
    {
      "host": "1.2.3.4",
      "port": 8302,
      "pkcs12Filepath": "client.pkcs12",
      "@comment": "Valid values are 1.0 and 1.2",
      "tlsVersion": 1.2
    }
  ]
}

```

```

    }
  ], ...

```

4.2.1.2 Monitor

The monitor is a separate thread that runs monitoring and maintenance tasks. By default, it runs every two minutes. It will report the number of events received and handled and will check the status of sub-processes. If there have been any problems, the monitor will place the client into an error state and the client will shut itself down.

Figure 9: Monitor Screen

```

"monitor": {
  "period": 120,
  "velocity": false,
  "bookmark": false,
  "subscribed": true,
  "handled": true
},

```

4.2.1.3 Start

The eStreamer server expects requests to state their chosen start time. There are broadly three options:

- 0: Return all data from the earliest point available on the FMC
- 1: Return all data from now onwards
- 2: Use a bookmark to pick up where we left off. First run is from 0

Figure 10: Start Screen

```

"@startComment": "0 for genesis, 1 for now, 2 for bookmark",
"start": 2,

```

4.2.1.4 Outputters (Output Data Location)

By default, only the Splunk outputter is enabled. It writes its data to a relative file location, but you may want to output the data to a different location. To change this, alter the `stream.uri` property to `file:///absolute/file/path/filename{o}.ext` where {o} is the timestamp placeholder.

Figure 11: Outputters Screen

```

"outputters": [
  {
    "name": "Splunk default",
    "adapter": "splunk",
    "enabled": true,
    "stream": {
      "uri": "relfile:///data/splunk/encore.log{o}",
      "options": {
        "rotate": true,
        "maxLogs": 9999
      }
    }
  }
],

```

4.2.2 Advanced Configuration Options

Key	Definition
enabled	true false. Controls whether eNcore will run.
connectTimeout	The duration in seconds the client will wait for a connection to establish before failing.
responseTimeout	The duration in seconds the client will wait for a response before timing out.
monitor.period	The period in seconds between each execution of monitor tasks. Default is 120. Lower numbers are useful for debugging but will create more log traffic.
monitor.velocity	true false. True will display the speed at which the client is processing records. A positive value means the client is processing events faster than eStreamer is sending them. Negative is slower. Once up to date, this should hover around zero.
monitor.bookmark	true false. True will show the last bookmark timestamp. This is useful to see how far behind the eNcore client is.
monitor.subscribed	true false. True will report the total number of events subscribed.
monitor.handled	true false. True will report the total number of events written to output.
Start	0 specifies oldest data available 1 specifies data as of now 2 specifies use of bookmark
logging.level	Levels include FATAL, ERROR, WARNING, INFO, DEBUG, VERBOSE, and TRACE. Select the level of logging as per your requirement. It is strongly recommended that you do not use anything above INFO for production environments. DEBUG will generate very large log files and TRACE will significantly affect performance.
logging.format	This describes the format of the log and how they are stored. Default configuration setting for message format is "{date-time}-{name of module}-{level of logging-message}".
logging.stdOut	true false. This determines whether log output is also shown in Standard Output.
logging.filepath	This specifies the location of the application log.

Key	Definition
maxQueueSize	Maximum number of messages buffered before throttling takes place. It is essentially a buffer size. The larger this number, the longer it will take to shutdown. Default configuration setting is 100. Do not change.
subscription.servers[]	While this is an array, eNcore can only currently support one server. The array is to support the future ability to connect to multiple hosts.
server.host	The IP address of the FMC (eStreamer Server). Default configuration is 1.2.3.4. If you change the host entry after having run eNcore then new cache, bookmark and metadata files will be generated.
server.port	The server port to connect to. Default 8302.
server.pkcs12Filepath	The PKCS12 filepath location. If you change this having already run eNcore, then you must also delete the cached public and private key otherwise eNcore will continue to use those. They are called {host}-{port}_pkcs.cert and {host}-{port}_pkcs.key.
server.tlsVersion	Valid options are 1.0 and 1.2.
subscription.records	Do not change these values.
handler.records.metadata	true false. If you wish to exclude the output of metadata (since it has no timestamp information) then set this to false.
handler.records.flows	true false. If you wish to exclude connection flow records then set this to false.
handler.outputters[]	An array of outputter controllers which define the behavior and format of what gets written by eNcore.
outputter.name	This is a human readable name for your convenience. It is unused by the code.
outputter.adapter	Data is read from eStreamer and stored in a structured internal format. The adapter transforms the data to a desired format. Recognized values are: <ul style="list-style-type: none"> — splunk — json
outputter.enabled	true false. You can have more than one outputter specified at once. If you wish to disable a specific outputter, set this flag to false. If all outputters are false (or there are no outputters) then it behaves as a sink.

Key	Definition
outputter.passthru	true false. If true then data flowing through bypasses decoding and metadata processing. It is very fast but of limited use. Its primary purpose is for debugging.
outputter.stream.uri	Specify the location where the output will be stored. You can specify a file URI as normal (e.g., file:///absolute/path/to/file) or a relative filepath (relfile:///relative/path/to/file). Only file URLs are supported currently.
outputter.stream.options	File-based streams require additional options.
option.rotate	true false. Set if you want log rotation. Default configuration setting for this is true. Please note that eNcore will not delete any old files. If you wish to do that, you will need to script it separately and schedule it. Example: Call this from a cron job. #!/bin/bash find /opt/splunk/etc/apps/eStreamer/log/* -mmin +1440 -exec rm {} \;
option.maxLogs	Specify the size of the log (number of lines). <i>Default configuration for this is 10,000. You can have fewer, larger files (e.g, 50,000).</i>

4.3 Execution

Various shell scripts options are available.

During installation and initial setup – or perhaps for debugging purposes it is useful to run the following commands.

```
./encore.sh test
```

And

```
./encore.sh foreground
```

In all other cases, it is expected that encore will be run in the background, for which the following commands are pertinent.

```
./encore.sh start
```

```
./encore.sh stop
```

```
./encore.sh restart
```

Figure 12: Start, Tail Log, Stop

```
sbs20@centos:~/eStreamer_eNcore-0.15
[sbs20@centos eStreamer_eNcore-0.15]$ ./encore.sh start
Starting "python ./estreamer/service.py estreamer.conf". Started. pid=9310
[sbs20@centos eStreamer_eNcore-0.15]$ tail -n 3 estreamer.log
2017-04-26 19:04:47,012 estreamer.bookmark INFO      Opening bookmark file /home/sbs20/eStreame
r_eNcore-0.15/fmc610-hb.sbs20.com-8302_bookmark.dat.
2017-04-26 19:04:47,012 estreamer.settings INFO      Timestamp: Start = 2 (Bookmark = 147635217
4)
2017-04-26 19:04:47,012 estreamer.subscriber INFO      StreamingRequestMessage: 000108010000003
800001a0b000000384890006157ff58ae0009000c000400150009001f000b003d000e00470004005b0007006500060
06f0002008300000000
[sbs20@centos eStreamer_eNcore-0.15]$ ./encore.sh stop
Found pid. Terminating "python ./estreamer/service.py estreamer.conf" (9310)
[sbs20@centos eStreamer_eNcore-0.15]$
```

```
sbs20@centos:~/eStreamer_eNcore-0.15
[sbs20@centos eStreamer_eNcore-0.15]$ ./encore.sh start
Starting "python ./estreamer/service.py estreamer.conf". Started. pid=9385
[sbs20@centos eStreamer_eNcore-0.15]$ ./encore.sh restart
Found pid. Terminating "python ./estreamer/service.py estreamer.conf" (9385)
Starting "python ./estreamer/service.py estreamer.conf". Started. pid=9435
[sbs20@centos eStreamer_eNcore-0.15]$ ./encore.sh stop
Found pid. Terminating "python ./estreamer/service.py estreamer.conf" (9435)
[sbs20@centos eStreamer_eNcore-0.15]$ tail -n 3 estreamer.log
2017-04-26 19:06:12,349 estreamer.client INFO      Process 9444 (handler) exit code: 0
2017-04-26 19:06:12,349 estreamer.monitor INFO      Stopping Monitor.
2017-04-26 19:06:12,550 estreamer.client INFO      Goodbye
[sbs20@centos eStreamer_eNcore-0.15]$
```

4.4 Logging

By default, eNcore will output an **estreamer.log** application log in its working directory with a log level of INFO. The format of the log file can be adjusted using the **logging.format** configuration setting. The level can also be adjusted. It is recommended that the default settings are left in place for production execution.

5 Troubleshooting and questions

5.1 Error messages

As far as possible, eNcore has been engineered to provide meaningful error messages. Below is an example error message.

Figure 13: Example Error Message

The eStreamer service has closed the connection. There are a number of possible causes which may show above in the error log.

If you see no errors then this could be that

- * the server is shutting down
- * there has been a client authentication failure (please check that your outbound IP address matches that associated with your certificate - note that if your device is subject to NAT then the certificate IP must match the upstream NAT IP)
- * there is a problem with the server. If you are running FMC v6.0, you may need to install "Sourcefire 3D Defense Center S3 Hotfix AZ 6.1.0.3-1")

If you encounter errors that do not make sense or require further explanation, then please contact support so that we can fix the problem and improve the error messages.

5.2 Frequently Asked Questions

Can I output my data to a different server?

Yes. Currently eNcore only writes to the filesystem, but you could mount an NFS or SMB share and specify its path as above. This may impact performance.

Can I run more than one instance?

Yes, using the CLI version. Although, currently, the `encore.sh` shell script only supports one instance. The underlying Python program prefixes temporary files (e.g., metadata, certificates, bookmarks) with the host and port. You will also need to update the outputter locations (e.g., `[Splunk] ... directory = splunk`) in order to avoid data collision. If you wish to run more than one instance we recommend you extract additional copies of eStreamer-eNcore and configure separately in order to avoid changing `encore.sh`.

Can I connect to more than one FMC?

Currently, not within a single instance. However, you can configure multiple instances as above.

Can eNcore de-duplicate data to keep my SIEM costs lower?

Not today. It is on the roadmap.

Can I run two instances of eNcore in a HA pair?

Yes and no. It is technically possible to run two side-by-side, but they will be completely ignorant of each other and output double the data. It may be preferable to run them in a hot-stand-by configuration where the primary client's state and configuration data is regularly copied to the secondary client. The state and configuration data in question is `estreamer.conf`; `x.x.x.x-port_bookmark.dat`; `x.x.x.x-port_cache.dat`; `x.x.x.x-port_pkcs.cert`; `x.x.x.x-port_pkcs.key`; `x.x.x.x-port_status.dat`

Can I increase the logging granularity?

Yes, change **logging.level** in the conf file. Please note that while it is possible to increase this level to VERBOSE, the performance impact will be crippling. DEBUG may be useful but slow. We strongly recommend not going above INFO for standard production execution.

6 Cisco Support

Support is provided by Cisco TAC.

7 Appendix A:

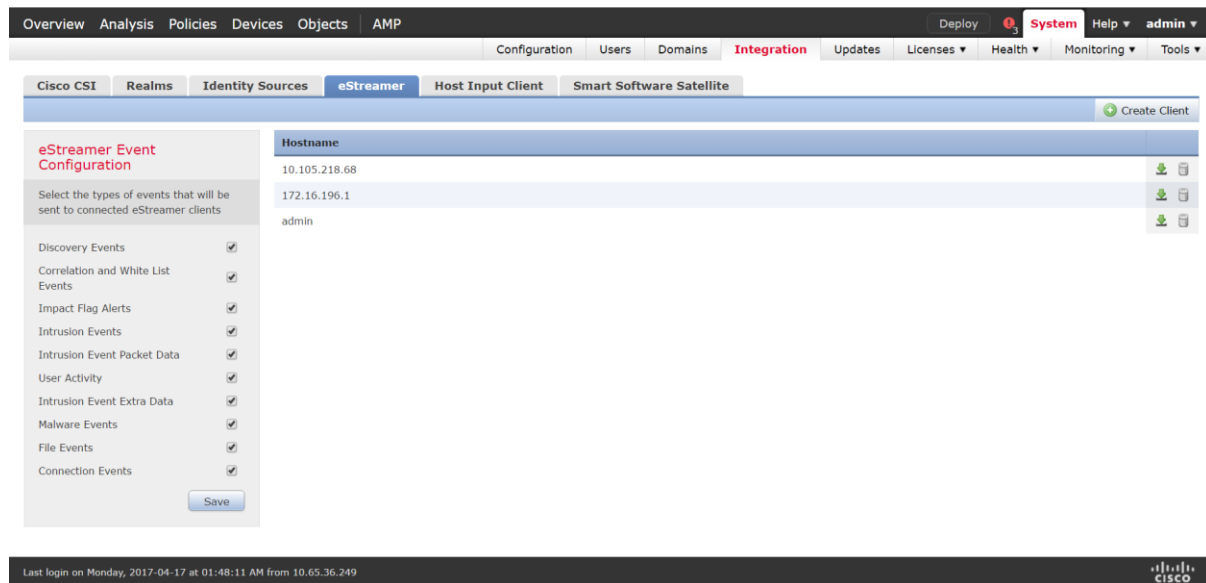
7.1 FMC eStreamer Certificate Creation

Steps to generate an eStreamer client certificate are as follows:

Navigate to the web interface of the FMC – <https://fmc-ip-address> and log in with your FMC credentials.

In the FMC 6.x GUI, navigate to **System > Integration > eStreamer**

Figure 14: FMC eStreamer Certificate Creation

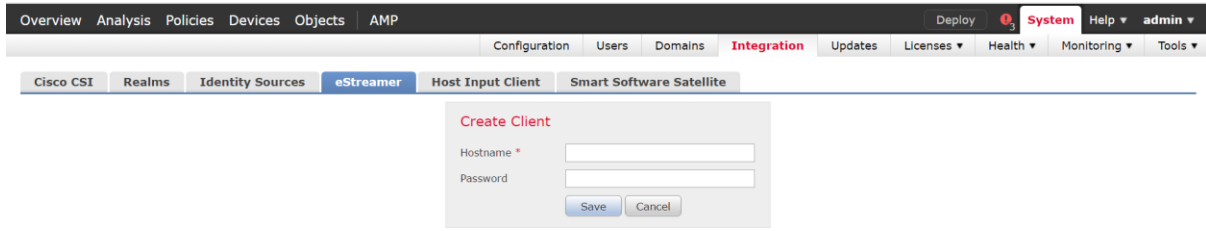


Click **Create Client**. Provide the Hostname and password.

Note: This should be the IP of the client, which will be collecting the event data from the FMC. This password will be required when you first execute eStreamer eNcore.

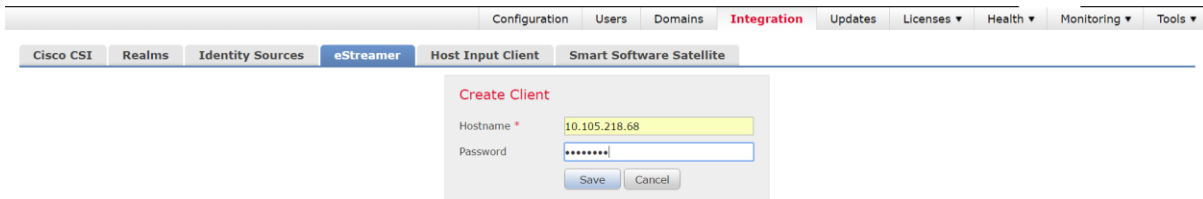
Please note that the IP address you enter here must be the IP address of the eStreamer-eNcore client *from the perspective of the FMC*. In other words, if the client is behind a NAT device, then the IP address must be that of the upstream NAT interface.

Figure 15: Create Client Hostname and Password Screen



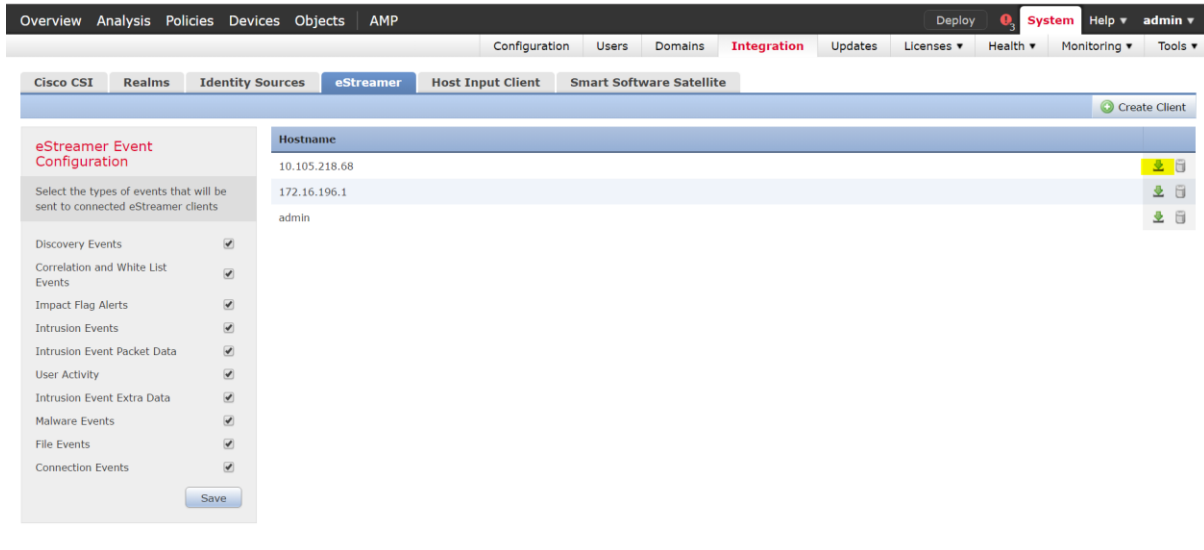
Click **Save**.

Figure 16: Create Client Save Screen



Download the pkcs12 file.

Figure 17: Download Screen



Copy the pkcs12 file to the desired location in the target device. By default, eStreamer-eNcore will look for `/path/eStreamer_eNcore/client.pkcs12`. If you wish to use a different filename, then you must edit the `estreamer.conf` file.

7.2 Example Configuration File

Figure 18: Example Configuration File

```
{
  "connectTimeout": 10,
  "responseTimeout": 10,

  "@startComment": "0 for genesis, 1 for now, 2 for bookmark",
  "start": 2,

  "monitor": {
    "period": 120,
    "velocity": false,
    "bookmark": false,
    "subscribed": true,
    "handled": true
  },

  "logging": {
    "@comment": "Levels include FATAL, ERROR, WARNING, INFO, DEBUG, VERBOSE and TRACE",
    "level": "INFO",
    "format": "%(asctime)s %(name)-12s %(levelname)-8s %(message)s",
    "stdOut": true,
    "filePath": "estreamer.log"
  },

  "@queueComment": [
    "Maximum number of messages buffered before throttling takes place. The more powerful",
    "your CPU and more RAM you have, the larger this number can be. It's essentially a",

```

```

"buffer size. Beyond a certain size you won't see any performance gain and it will",
"just take longer to stop"
],

"maxQueueSize": 100,

"subscription": {
  "servers": [
    {
      "host": "1.2.3.4",
      "port": 8302,
      "pkcs12Filepath": "client.pkcs12",
      "@comment": "Valid values are 1.0 and 1.2",
      "tlsVersion": 1.2
    }
  ],

  "records": {
    "@comment": [
      "Just because we subscribe doesn't mean the server is sending. Nor does it mean",
      "we are writing the records either. See handler.records[]"
    ],
    "packetData": true,
    "extended": true,
    "metadata": true,
    "eventExtraData": true,
    "impactEventAlerts": true,
    "intrusion": true,
    "archiveTimestamps": true
  }
},

"handler": {
  "records": {
    "core": true,
    "metadata": true,
    "flows": true,
    "packets": true,
    "intrusion": true,
    "rua": true,
    "rna": true,

    "@includeComment": "These records will be included regardless of above",
    "include": [],

    "@excludeComment": [
      "These records will be excluded regardless of above (overrides 'include')",
      "e.g. to exclude flow and IPS events use [ 71, 400 ]"
    ],
    "exclude": []
  },

  "@comment": "If you disable all outputters it behaves as a sink",
  "outputters": [

```



```

    {
      "name": "Splunk default",
      "adapter": "splunk",
      "enabled": true,
      "stream": {
        "uri": "refile:///data/splunk/encore.log{o}",
        "options": {
          "rotate": true,
          "maxLogs": 9999
        }
      }
    },
    {
      "name": "JSON",
      "adapter": "json",
      "enabled": false,
      "stream": {
        "uri": "refile:///data/json/log{o}.json",
        "options": {
          "rotate": true,
          "maxLogs": 9999
        }
      }
    }
  ]
}

```

Trademarks and Disclaimers

THE SPECIFICATIONS AND INFORMATION REGARDING THE PRODUCTS IN THIS MANUAL ARE SUBJECT TO CHANGE WITHOUT NOTICE. ALL STATEMENTS, INFORMATION, AND RECOMMENDATIONS IN THIS MANUAL ARE BELIEVED TO BE ACCURATE BUT ARE PRESENTED WITHOUT WARRANTY OF ANY KIND, EXPRESS OR IMPLIED. USERS MUST TAKE FULL RESPONSIBILITY FOR THEIR APPLICATION OF ANY PRODUCTS.

THE SOFTWARE LICENSE AND LIMITED WARRANTY FOR THE ACCOMPANYING PRODUCT ARE SET FORTH IN THE INFORMATION PACKET THAT SHIPPED WITH THE PRODUCT AND ARE INCORPORATED HEREIN BY THIS REFERENCE. IF YOU ARE UNABLE TO LOCATE THE SOFTWARE LICENSE OR LIMITED WARRANTY, CONTACT YOUR CISCO REPRESENTATIVE FOR A COPY.

The Cisco implementation of TCP header compression is an adaptation of a program developed by the University of California, Berkeley (UCB) as part of UCB's public domain version of the UNIX operating system. All rights reserved. Copyright © 1981, Regents of the University of California.

NOTWITHSTANDING ANY OTHER WARRANTY HEREIN, ALL DOCUMENT FILES AND SOFTWARE OF THESE SUPPLIERS ARE PROVIDED "AS IS" WITH ALL FAULTS. CISCO AND THE ABOVE-NAMED SUPPLIERS DISCLAIM ALL WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING, WITHOUT LIMITATION, THOSE OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE AND NONINFRINGEMENT OR ARISING FROM A COURSE OF DEALING, USAGE, OR TRADE PRACTICE.

IN NO EVENT SHALL CISCO OR ITS SUPPLIERS BE LIABLE FOR ANY INDIRECT, SPECIAL, CONSEQUENTIAL, OR INCIDENTAL DAMAGES, INCLUDING, WITHOUT LIMITATION, LOST PROFITS OR LOSS OR DAMAGE TO DATA ARISING OUT OF THE USE OR INABILITY TO USE THIS MANUAL, EVEN IF CISCO OR ITS SUPPLIERS HAVE BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES.

Any Internet Protocol (IP) addresses and phone numbers used in this document are not intended to be actual addresses and phone numbers. Any examples, command display output, network topology diagrams, and other figures included in the document are shown for illustrative purposes only. Any use of actual IP addresses or phone numbers in illustrative content is unintentional and coincidental.

All printed copies and duplicate soft copies are considered un-Controlled copies and the original on-line version should be referred to for latest version.

Cisco has more than 200 offices worldwide. Addresses, phone numbers, and fax numbers are listed on the Cisco website at www.cisco.com/go/offices.

Cisco and the Cisco logo are trademarks or registered trademarks of Cisco and/or its affiliates in the U.S. and other countries. To view a list of Cisco trademarks, go to this URL: www.cisco.com/go/trademarks. Third-party trademarks mentioned are the property of their respective owners. The use of the word partner does not imply a partnership relationship between Cisco and any other company. (1110R)

© 2017 Cisco Systems, Inc. All rights reserved.