



Encrypted Traffic Analytics Configuration Guide, Cisco IOS XE Fuji 16.8.x

Americas Headquarters

Cisco Systems, Inc.
170 West Tasman Drive
San Jose, CA 95134-1706
USA
<http://www.cisco.com>
Tel: 408 526-4000
800 553-NETS (6387)
Fax: 408 527-0883

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 NON-INFRINGEMENT 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.

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: <https://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. (1721R)

© 2017 Cisco Systems, Inc. All rights reserved.



CONTENTS

CHAPTER 1

Read Me First 1

CHAPTER 2

Encrypted Traffic Analytics 3

Feature Information for Encrypted Traffic Analytics 3

Restrictions for Encrypted Traffic Analytics 4

Information About Encrypted Traffic Analytics 4

 Data Elements for Encrypted Traffic 4

How to Configure Encrypted Traffic Analytics 5

 Enabling ET-Analytics on an Interface 5

 Applying an ACL for Whitelisting 6

Verifying the ET-Analytics Configuration 6



Read Me First

Important Information about Cisco IOS XE 16

Effective Cisco IOS XE Release 3.7.0E (for Catalyst Switching) and Cisco IOS XE Release 3.17S (for Access and Edge Routing) the two releases evolve (merge) into a single version of converged release—the Cisco IOS XE 16—providing one release covering the extensive range of access and edge products in the Switching and Routing portfolio.

Feature Information

Use [Cisco Feature Navigator](#) to find information about feature support, platform support, and Cisco software image support. An account on Cisco.com is not required.

Related References

- [Cisco IOS Command References, All Releases](#)

Obtaining Documentation and Submitting a Service Request

For information on obtaining documentation, using the Cisco Bug Search Tool (BST), submitting a service request, and gathering additional information, see [What's New in Cisco Product Documentation](#).

To receive new and revised Cisco technical content directly to your desktop, you can subscribe to the [What's New in Cisco Product Documentation RSS feed](#). RSS feeds are a free service.



Encrypted Traffic Analytics

Encrypted Traffic Analytics (ET-Analytics) is used to identify malware communications in encrypted traffic. ET-Analytics uses passive monitoring, extraction of relevant data elements, and supervised machine learning with cloud-based global visibility. ET-Analytics exports the relevant data elements in the form of NetFlow record fields to detect whether the packet flow has malware, and these NetFlow record fields include IDP (initial data packet) and SPLT (Sequence of Packet Length and Time).

- [Feature Information for Encrypted Traffic Analytics, page 3](#)
- [Restrictions for Encrypted Traffic Analytics, page 4](#)
- [Information About Encrypted Traffic Analytics, page 4](#)
- [How to Configure Encrypted Traffic Analytics, page 5](#)
- [Verifying the ET-Analytics Configuration, page 6](#)

Feature Information for Encrypted Traffic Analytics

The following table provides release information about the feature or features described in this module. This table lists only the software release that introduced support for a given feature in a given software release train. Unless noted otherwise, subsequent releases of that software release train also support that feature.

Use Cisco Feature Navigator to find information about platform support and Cisco software image support. To access Cisco Feature Navigator, go to www.cisco.com/go/cfn. An account on Cisco.com is not required.

Table 1: Feature Information for Encrypted Traffic Analytics (ET-Analytics)

Feature Name	Releases	Feature Information
Encrypted Traffic Analytics	Cisco IOS XE Fuji 16.7.1	Encrypted Traffic Analytics (ET-Analytics) is used to identify malware communications in encrypted traffic. ET-Analytics uses passive monitoring, extraction of relevant data elements, and supervised machine learning with cloud-based global visibility. ET-Analytics exports the relevant data elements in the form of NetFlow record fields to detect whether the packet flow has malware, and these NetFlow record fields include IDP (initial data packet) and SPLT (Sequence of Packet Length and Time).
Encrypted Traffic Analytics	Cisco IOS XE Fuji 16.8.1	Support for VRF keyword in flow destinations was added.

Restrictions for Encrypted Traffic Analytics

ET-Analytics is not supported on management interfaces, VRF-Aware Software Infrastructure (VASI) interface, and internal interfaces.

Information About Encrypted Traffic Analytics

Data Elements for Encrypted Traffic

ET-Analytics uses intraflow metadata to identify malware components, maintaining the integrity of the encrypted traffic without the need for bulk decryption and without compromising on data integrity.

ET-Analytics extracts the following main data elements from the network flow: the sequence of packet lengths and times (SPLT), TLS-specific features, and the initial data packet (IDP). Cisco's Application-Specific Integrated Circuit (ASIC) architecture provides the ability to extract these data elements without slowing down the data network. Separate templates can be defined for each of the data elements.

Transport Layer Security (TLS) is a cryptographic protocol that provides privacy for applications. TLS is usually implemented with common protocols such as HTTP for web browsing or Simple Mail Transfer Protocol (SMTP) for email. HTTPS is the use of TLS over HTTP; this protocol is used to secure communication between a web server and client and is supported by most major web servers.

The TLS template is used to report several of the TLS parameters in use for a flow. These parameters help in finding the use of insecure cipher suites, out-of-date protocol version, and so on.

- Sequence of Packet Lengths and Times (SPLT) □ SPLT contains the length (number of bytes) of each packet's application payload for the first several packets of a flow, along with the inter-arrival times of those packets. SPLT can be represented as an array of packet sizes (in bytes) along with an array of times (in milliseconds) indicating the time since the previous packet was observed. The SPLT template is used to report packet size and timing information for a flow, which is useful to analyze encrypted traffic and find malicious flows or perform other classifications.
- Initial Data Packet (IDP) □ IDP obtains packet data from the first packet of a flow. It allows extraction of data such as an HTTP URL, DNS hostname/address, and other data elements. The TLS handshake is composed of several messages that contain unencrypted metadata used to extract data elements such as cipher suites, TLS versions, and the client's public key length. The IDP template is used to report packet data from the first data packet of a flow. This template allows collectors to perform application classification of a flow (for example, using Snort).

How to Configure Encrypted Traffic Analytics

Enabling ET-Analytics on an Interface

DETAILED STEPS

	Command or Action	Purpose
Step 1	<code>enable</code>	Enables privileged EXEC mode. <ul style="list-style-type: none"> • Enter your password if prompted.
Step 2	<code>configure terminal</code>	Enters global configuration mode.
Step 3	<code>et-analytics</code>	Enters encrypted traffic analytics configuration mode.
Step 4	<code>ip flow-export destination ip-address port [vrf vrf-name]</code>	Configures the destination IP address optional VRF name. The ETA records are exported to this destination.
Step 5	<code>exit</code>	Returns to global configuration mode.
Step 6	<code>interface interface-id</code>	Specifies the interface and port number and enters interface configuration mode.
Step 7	<code>et-analytics enable</code>	Enables encrypted traffic analytics on this interface.
Step 8	<code>end</code>	Returns to privileged EXEC mode.

```
Device> enable
Device# configure terminal
Device(config)# et-analytics
```

```

Device(config-et-analytics)# ip flow-export destination 192.0.2.1 2055 vrf green
Device(config-et-analytics)# exit
Device(config)# interface gigabitethernet 0/0/1
Device(config-if)# et-analytics enable
Device(config-if)# end

```

Applying an ACL for Whitelisting

DETAILED STEPS

	Command or Action	Purpose
Step 1	enable	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	configure terminal	Enters global configuration mode.
Step 3	et-analytics	Enters encrypted traffic analytics configuration mode.
Step 4	whitelist acl <i>access-list</i>	Whitelists the specified access list traffic. The access list can be a standard, extended, or named ACL.
Step 5	exit	Returns to global configuration mode.
Step 6	ip access-list extended <i>access-list</i>	Specifies a named extended access list and enters extended access list configuration mode.
Step 7	permit ip { <i>ip-address</i> any host object-group }	Specifies the packets to forward to a source host or source IP address.
Step 8	end	Returns to privileged EXEC mode.

```

Device> enable
Device# configure terminal
Device(config)# et-analytics
Device(config-et-analytics)# whitelist acl eta_whitelist
Device(config-et-analytics)# exit
Device(config)# ip access-list extended eta_whitelist
Device(config-ext-nacl)# permit ip host 198.51.100.1 any
Device(config-ext-nacl)# permit ip any host 198.51.100.1
Device(config-ext-nacl)# permit ip host 198.51.200.1 any
Device(config-ext-nacl)# permit ip any host 198.51.200.1
Device(config-ext-nacl)# end

```

Verifying the ET-Analytics Configuration

The following **show** commands are used to see the platform ET-analytics, threat-visibility interfaces, FMAN FP global and interface information, and ET-analytics datapath information. Given below are the sample outputs of the **show** commands.

```
Device# show platform hardware qfp active feature et-analytics data interface gigabitEthernet
```

2

```
uidb handle: 0x3fe
Interface Name: GigabitEthernet2
```

Device# show platform hardware qfp active feature et-analytics data memory

```
ET-Analytics memory information:

Size of FO           : 3200 bytes
No. of FO allocs    : 952903
No. of FO frees     : 952902
```

Device# show platform hardware qfp active feature et-analytics data runtime

```
ET-Analytics run-time information:

Feature state       : initialized (0x00000004)
Inactive timeout   : 15 secs (default 15 secs)
Flow CFG information : !Flow Table Infrastructure information internal to ETA!
  instance ID      : 0x0
  feature ID       : 0x0
  feature object ID : 0x0
  chunk ID        : 0x4
```

Device# show platform hardware qfp active feature et-analytics datapath stats export

```
ET-Analytics 192.168.1.100:2055 vrf 2 Stats:
Export statistics:
  Total records exported      : 2967386
  Total packets exported     : 1885447
  Total bytes exported       : 2056906120
  Total dropped records      : 0
  Total dropped packets     : 0
  Total dropped bytes       : 0
  Total IDP records exported :
    initiator->responder : 805813
    responder->initiator : 418799
  Total SPLT records exported:
    initiator->responder : 805813
    responder->initiator : 418799
  Total SALT records exported:
    initiator->responder : 0
    responder->initiator : 0
  Total BD records exported :
    initiator->responder : 0
    responder->initiator : 0
  Total TLS records exported :
    initiator->responder : 171332
    responder->initiator : 174860
ET-Analytics 172.27.56.99:2055 Stats:
Export statistics:
  Total records exported      : 2967446
  Total packets exported     : 1885448
  Total bytes exported       : 2056909280
  Total dropped records      : 0
  Total dropped packets     : 0
  Total dropped bytes       : 0
  Total IDP records exported :
    initiator->responder : 805813
    responder->initiator : 418799
  Total SPLT records exported:
    initiator->responder : 805813
    responder->initiator : 418799
  Total SALT records exported:
    initiator->responder : 0
    responder->initiator : 0
  Total BD records exported :
    initiator->responder : 0
    responder->initiator : 0
  Total TLS records exported :
```

```
initiator->responder : 171332
responder->initiator : 174860
```

```
Device# show platform hardware qfp active feature et-analytics datapath stats flow
```

```
ET-Analytics Stats:
Flow statistics:
feature object allocs : 0
feature object frees : 0
flow create requests : 0
flow create matching : 0
flow create successful: 0
flow create failed, CFT handle: 0
flow create failed, getting FO: 0
flow create failed, malloc FO : 0
flow create failed, attach FO : 0
flow create failed, match flow: 0
flow create, aging already set: 0
flow ageout requests : 0
flow ageout failed, freeing FO: 0
flow ipv4 ageout requests : 0
flow ipv6 ageout requests : 0
flow whitelist traffic match : 0
```

```
Device# show vrf tableid
```

VRF Name	Tableid	Address Family
Mgmt-intf	0x00000001	ipv4 unicast
Mgmt-intf	0x1E000001	ipv6 unicast
blu	0x00000002	ipv4 unicast
red	0x00000003	ipv4 unicast