Wireless LAN Configuration Guide, Cisco IOS XE Release 3SE (Cisco WLC 5700 Series)

Support for AVC on Wireless LAN

Application Visibility and Control (AVC) classifies applications using deep packet inspection techniques with the Network-Based Application Recognition (NBAR2) engine, and provides application-level visibility and control into Wi-Fi networks. After the applications are recognized, the AVC feature enables you to either drop or mark the data traffic.

Finding Feature Information

Your software release may not support all the features documented in this module. For the latest caveats and feature information, see Bug Search Tool and the release notes for your platform and software release. To find information about the features documented in this module, and to see a list of the releases in which each feature is supported, see the feature information table.

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.

Restrictions for Support for AVC on Wireless LAN

- AVC is supported on WLANs configured for central switching only.

- IPv6 including ICMPv6 traffic classifications are not supported.

- Datalink is not supported for NetFlow fields for AVC.

- Multicast traffic is not supported.

- The template timeout cannot be modified on exporters configured with AVC. Even if the template timeout value is configured to a different value, only the default value of 600 seconds is used.

Information About Support for Cisco Application Visibility and Control on Wireless LAN

AVC on Wireless LAN Overview

Application Visibility and Control (AVC) solution for wireless networks identifies more than 1000 business– or consumer–class applications using deep packet inspection (DPI). The support of AVC embedded within the WLAN infrastructure extends as an end-to-end solution, which gives a complete visibility of applications in the network and allows administrators to do one of the following:

- Mark applications for further prioritization.

- Block applications for security reasons.

- Conserve limited network bandwidth.

Components of an Application Visibility and Control Network

Application Visibility and Control feature consist of the following components:

- Cisco Network-Based Application Recognition Version 2 (NBAR2)— a next-generation DPI technology that identifies more than 1000 applications and supports application categorization, with the ability to update the protocol definition.

- Cisco NetFlow v9— to select and export data of interest, allowing easy consumption of application performance statistics by Cisco and third-party applications

- Cisco Prime™ Infrastructure— an enterprise-grade infrastructure and service-monitoring tool which reports application and network performance to facilitate up to 30 different reports for application visibility.

Cisco NBAR Memory for Application Visibility and Control

Cisco NBARv2 is an essential part of Cisco Application Visibility and Control. In general, Cisco NBAR is can increase application performance through better QoS and policing, and visibility into what applications are using the network by determining that a particular network flow is from a specific application. This is done using various techniques. Upon detection of a flow, a protocol ID is assigned to it. The protocol ID is then used by the solution to determine the appropriate actions on packets belonging to that flow. Cisco Application Visibility and Control (AVC) uses the NBARv2 flow table to store per flow information. It can only act on flows which have an active session in the flow table.

Benefits for Support for AVC on Wireless LAN

- Improved quality of experience for all wireless users through application-level optimization and control.

- Proactive monitoring and end-to-end application visibility to accelerate troubleshooting and minimize network downtime.

- Network capacity management and planning through greater visibility of application usage and performance.

- Prioritization of business-critical applications and sub-flows like Cisco Jabber voice or IM sessions.

How to Configure Support for AVC on Wireless LAN

Creating a Flow Record

Procedure

	Command or Action	Purpose
Step 1	**enable** **Example:** `Device> enable`	Enables privileged EXEC mode. • Enter your password if prompted.

	Command or Action	Purpose
Step 2	**configure terminal** **Example:** `Device# configure terminal`	Enters global configuration mode.

Step 3	**flow record** *flow_record_name*
	
	Example:
	
	`Device (config)# flow record fr_name`
	`Device(config-flow-record)#`
		Enters flow record configuration mode.

Step 4	**description** *flow_record_description* **Example:** `Device(config-flow-record)# description fr_desc`	(Optional) Describes the flow record as a maximum 63-character string.

Step 5	**match ipv4** {**protocol** | **source address** | **destination address**}
	
	Example:
	
	`Device(config-flow-record)# match ipv4 protocol`
	`Device(config-flow-record)# match ipv4 source address`
	`Device(config-flow-record)# match ipv4 destination address`
		• Specifies a match to the IPv4 protocol.
		
		• Specifies a match to the IPv4 source address-based field.
		
		• Specifies a match to the IPv4 destination address-based field.

Step 6	**match transport** {**source-port** | **destination-port**}
	
	Example:
	
	`Device(config-flow-record)# match transport source-port`
	`Device(config-flow-record)# match transport destination-port`
		• Specifies a match to the transport layer source-port field.
		
		• Specifies a match to the transport layer destination-port field.

Step 7	**match application name** **Example:** `Device(config-flow-record)# match application name`	• Specifies a match to the application name.
Step 8	**match wireless ssid** **Example:** `Device(config-flow-record)# match wireless ssid`	• Specifies a match to the SSID name identifying the wireless network.
Step 9	**collect counter** {**bytes** | **packets**} **long**	• Specifies to collect counter fields total bytes.

	Command or Action	Purpose
		• Specifies to collect counter fields total packets.
	Example:	
	`Device(config-flow-record)# collect counter bytes long` `Device(config-flow-record)# collect counter packets long`	
Step 10	**collect wireless {ap | client} mac address**	• Specifies to collect the MAC addresses of the access points that the wireless client is associated with.
	Example:	• Specifies to collect MAC address of the client on the wireless network.
	`Device(config-flow-record)# collect wireless ap mac address` `Device(config-flow-record)# collect wireless client mac address`	
Step 11	**end**	Leaves global configuration mode and returns to privileged EXEC mode.
	Example:	
	`Device(config)# end`	

Creating a Flow Exporter

You can create a flow export to define the export parameters for a flow. This is an optional procedure for configuring flow parameters.

Procedure

	Command or Action	Purpose
Step 1	**enable**	Enables privileged EXEC mode.
	Example:	• Enter your password if prompted.
	`Device> enable`	
Step 2	**configure terminal**	Enters global configuration mode.
	Example:	
	`Device# configure terminal`	
Step 3	**flow exporter** *flow_exporter_name*	Enters flow exporter configuration mode.
	Example:	
	`Device (config)# flow exporter fe_name` `Device(config-flow-exporter)#`	

	Command or Action	Purpose
Step 4	**description** *string* **Example:** `Device (config-flow-exporter)# description fe_desc`	Describes the flow record as a maximum 63-character string.
Step 5	**destination** {*hostname* | *ip-address*} **Example:** `Device (config)# (config-flow-exporter) # destination 192.0.2.1`	Specifies the hostname or IPv4 address of the system to which the exporter sends data.
Step 6	**transport udp** *port-value* **Example:** `Device (config-flow-exporter) # transport udp 2`	Configures a port value for the UDP protocol. The range is from 1 to 65535.
Step 7	**option application-table timeout** *seconds* **Example:** `Device (config-flow-exporter) # transport udp 2`	(Optional) Specifies application table timeout option. The valid range is from 1 to 86400 seconds.
Step 8	**option usermac-table timeout** *option_resend_time* **Example:** `Device (config-flow-exporter) # transport udp 2`	(Optional) Specifies wireless usermac-to-username table option. The range is from 1 to 86400 seconds.
Step 9	**end** **Example:** `Device(config)# end`	Leaves global configuration mode and returns to privileged EXEC mode.

Creating a Flow Monitor

You can create a flow monitor and associate it with a flow record and a flow exporter.

Procedure

	Command or Action	Purpose
Step 1	**enable** **Example:** `Device> enable`	Enables privileged EXEC mode. • Enter your password if prompted.

	Command or Action	Purpose
Step 2	**configure terminal** **Example:** `Device# configure terminal`	Enters global configuration mode.

Step 3	**flow monitor** *flow_monitor_name*
	
	Example:
	
	`Device (config)# flow monitor fm_name`
	`Device(config-flow-monitor)#`
		Creates a flow monitor and enters flow monitor configuration mode.

Step 4	**description** *flow_monitor_description* **Example:** `Device(config-flow-record)# description fm_desc`	(Optional) Describes the flow record as a maximum 63-character string.
Step 5	**record** *flow_record-name* **Example:** `Device (config-flow-monitor)# record fr_name`	Specifies the name of a recorder that was created previously.
Step 6	**exporter** *flow-exporter-name* **Example:** `Device (config-flow-monitor)# exporter fe_name`	Specifies the name of an exporter that was created previously.

Step 7	**cache timeout {active | inactive} {active | inactive}**
	
	Example:
	
	`Device(config-flow-monitor)# cache timeout active 1800`
	`Device(config-flow-monitor)# cache timeout inactive 200`
		Specifies flow cache timeout parameters. You can configure for a time period of 1 to 604800 seconds.
		
		Note To achieve optimal result for the AVC flow monitor, it is recommended that you configure the inactive cache timeout value to be greater than 90 seconds.

Step 8	**end** **Example:** `Device(config)# end`	Leaves global configuration mode and returns to privileged EXEC mode.
Step 9	**show flow monitor** *flow-monitor-name* **Example:** `Device # show flow monitor fm_name`	

Configuring Wireless LAN to Apply Flow Monitor

You can configure a Wireless LAN to apply flow monitor in IPV4 and IPv6 Input/Output direction.

Procedure

	Command or Action	**Purpose**
Step 1	**enable** **Example:** `Device> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Device# configure terminal`	Enters global configuration mode.

Step 3	**wlan** *wlan-name wlan-id*
	
	Example:
	
	`Device (config)# wlan wlan-name 11`
	`Device(config-wlan)#`
		Enters WLAN configuration submode. For *wlan-id*, enter the WLAN ID. The range is 1 to 512.

Step 4	**ip flow monitor** *flow-monitor-name* {**input**	**ouput**}
		
		Example:
		
		`Device (config-wlan)# ip flow monitor fm_name`
		`input`
		`Device (config-wlan)# ip flow monitor fm_name`
		`output`
			Associates a flow monitor to the WLAN for input or output packets.

Step 5	**end** **Example:** `Device(config)# end`	Leaves global configuration mode and returns to privileged EXEC mode.

Monitoring Application Visibility and Control

The following commands can be used to monitor application visibility and control on the device.

Procedure

Step 1   **show avc client** *client-mac* **top** *n* **application** [**aggregate**|**upstream**|**downstream**]

Example:

```
Cumulative Stats:
No.   AppName    Packet-Count    Byte-Count    AvgPkt-Size    usage%
--------------------------------------------------------------------
1     skinny     7343            449860        61             94
2     unknown    99              13631         137            3
3     dhcp       18              8752          486            2
4     http       18              3264          181            1
5     tftp       9               534           59             0
6     dns        2               224           112            0

Last Interval(90 seconds) Stats:
No.   AppName    Packet-Count    Byte-Count    AvgPkt-Size    usage%
--------------------------------------------------------------------
1     skinny     9               540           60             100
```

Displays information about top "n" applications for the given client MAC.

Step 2   **show avc wlan** *ssid* **top** *n* **application [aggregate|upstream|downstream]**

Example:

```
Device# show avc wlan Lobby_WLAN top 10 application aggregate
Cumulative Stats:
No.   AppName    Packet-Count    Byte-Count    AvgPkt-Size    usage%
--------------------------------------------------------------------
1     ssl        10598677        1979525706    997            42
2     vnc        5550900         3764612847    678            14
3     http       3043131         2691327197    884            10
4     unknown    1856297         1140264956    614            4
5     video-over-http 1625019    2063335150    1269           8
6     binary-over-http 1329115   1744190344    1312           6
7     webex-meeting 1146872      540713787     471            2
8     rtp        923900          635650544     688            2
9     unknown    752341          911000213     1210           3
10    youtube    631085          706636186     1119           3


Last Interval(90 seconds) Stats:
No.   AppName    Packet-Count    Byte-Count    AvgPkt-Size    usage%
--------------------------------------------------------------------
1     vnc        687093          602731844     877            68
2     video-over-http 213272     279831588     1312           31
3     ssl        6515            5029365       771            1
4     webex-meeting 3649         1722663       472            0
5     http       2634            1334355       506            0
6     unknown    1436            99412         69             0
7     google-services 722        378121        523            0
8     linkedin   655             393263        600            0
9     exchange   432             167390        387            0
10    gtalk-chat 330             17330         52             0
```

Displays information about top "n" applications for the given SSID.

Step 3   **show flow monitor** *flow_monitor_name* **cache**

Example:

```
Device# show flow monitor FLOW-MONITOR-1
Flow Monitor FLOW-MONITOR-1:
  Description:        Used for basic traffic analysis
  Flow Record:       flow-record-1
  Flow Exporter:     flow-exporter-1
                     flow-exporter-2
  Cache:
```

```
Type:              normal
Status:            allocated
Size:              4096 entries / 311316 bytes
Inactive Timeout:  15 secs
Active Timeout:    1800 secs
Update Timeout:    1800 secs
```

Displays information about flow monitors.

Clearing Application Visibility and Control Statistics

The following commands can be used to clear the statistics of application visibility and control.

Procedure

	Command or Action	Purpose
Step 1	**clear avc client** *mac* **statistics** **Example:** `Device# clear avc client mac statistics`	Clears the statistics per client.
Step 2	**clear avc wlan** *ssid-name***statistics** **Example:** `Device# clear avc wlan`	Clears the statistics per WLAN.

Configuration Examples for Support for AVC on Wireless LAN

Example Configuring Support for AVC on Wireless LAN

This example shows how to create a flow record, create a flow monitor, apply the flow record to the flow monitor, and apply the flow monitor on a WLAN:

```
Device(config)# flow record fr_v4
Device(config-flow-record)# match ipv4 protocol
Device(config-flow-record)# match ipv4 source address
Device(config-flow-record)# match ipv4 destination address
Device(config-flow-record)# match transport destination-port
Device(config-flow-record)# match flow direction
Device(config-flow-record)# match application name
Device(config-flow-record)# match wireless ssid
Device(config-flow-record)# collect counter bytes long
Device(config-flow-record)# collect counter packets long
Device(config-flow-record)# collect wireless ap mac address
Device(config-flow-record)# collect wireless client mac address
Device(config)#end

Device# configure terminal
```

```
Device# flow monitor fm_v4
Device(config-flow-monitor)# record fr_v4
Device(config-flow-monitor)# cache timeout active 1800
Device(config)#end

Device(config)#wlan wlan1
Device(config-wlan)#ip flow monitor fm_v4 input
Device(config-wlan)#ip flow mon fm-v4 output
Device(config)#end

Device(config)#flow monitor fm_v4 cache
```

Additional References Support for AVC on Wireless LAN

Related Documents

Related Topic	Document Title
Cisco IOS commands	Cisco IOS Master Commands List, All Releases
Overview of Cisco IOS NetFlow	Cisco IOS NetFlow Overview
List of the features documented in the *Cisco IOS NetFlow Configuration Guide*	Cisco IOS NetFlow Features Roadmap
The minimum information about and tasks required for configuring NetFlow and NetFlow Data Export	Getting Started with Configuring NetFlow and NetFlow Data Export
Tasks for configuring NetFlow to capture and export network traffic data	Configuring NetFlow and NetFlow Data Export
Tasks for configuring NetFlow multicast support	Configuring NetFlow Multicast Accounting
Tasks for detecting and analyzing network threats with NetFlow	Detecting and Analyzing Network Threats With NetFlow
Tasks for configuring Cisco NBAR	Classifying Network Traffic Using NBAR
NBAR commands.	Cisco IOS Quality of Service Solutions Command Reference

Standards

Standards	Title
No new or modified standards are supported by this feature, and support for existing standards has not been modified by this feature.	—

MIBs

MIBs	MIBs Link
None	No new MIBs were created for this feature. To locate and download MIBs for selected platforms, Cisco IOS releases, and feature sets, use Cisco MIB Locator found at the following URL: http://www.cisco.com/go/mibs

RFCs

RFCs	Title
No new or modified RFCs are supported by this feature.	—

Technical Assistance

Description	Link
The Cisco Support and Documentation website provides online resources to download documentation, software, and tools. Use these resources to install and configure the software and to troubleshoot and resolve technical issues with Cisco products and technologies. Access to most tools on the Cisco Support and Documentation website requires a Cisco.com user ID and password.	http://www.cisco.com/cisco/web/support/index.html

Feature Information for Support for AVC on Wireless LAN

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 . An account on Cisco.com is not required.

Table 1: Feature Information for Support for AVC on Wireless LAN

Feature Name	Releases	Feature Information
Support for AVC on Wireless LAN	Cisco IOS XE Release 3.3SE	The Cisco Application Visibility and Control (AVC) solution for wireless networks identifies more than 1000 business– or consumer–class applications using deep packet inspection (DPI). The following commands are introduced or modified in the feature documented in this module: • **flow record** *record_name* • **flow exporter** *flow_exporter_name* • **flow monitor** *flow_monitor_name* In Cisco IOS XE Release 3.3SE, this feature is supported on Cisco 5700 Wireless LAN Controllers.

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