Configuring Application Visibility and Control

Finding Feature Information

Your software release may not support all of the features documented in this module. For the latest feature information and caveats, see the release notes for your platform and software release.

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Information About Application Visibility and Control

Application Visibility and Control (AVC) classifies applications using deep packet inspection techniques with the Network-Based Application Recognition 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.

Using AVC, we can detect more than 1000 applications. AVC enables you to perform real-time analysis and create policies to reduce network congestion, costly network link usage, and infrastructure upgrades.

Note You can view list of 30 applications in Top Applications in Monitor Summary section of the UI.

AVC DSCP marks only the DSCP of the original packet in the controller in both directions (upstream and downstream). It does not affect the outer CAPWAP DCSP. AVC DSCP is applicable only when the application is classified. For example, based on the AVC profile configuration, if an application is classified as ftp or http, the corresponding DSCP marking is applied irrespective of the WLAN QoS. For downstream, the DSCP value of outer CAPWAP header and inner packet's DSCP are taken from AVC DSCP. WLAN QoS is only applicable for all traffic from WLC to AP through CAPWAP. It does not change the DSCP of the original packet

Restrictions for Application Visibility and Control

How to Configure Application Visibility and Control

Configuring Application Visibility and Control (CLI)

To configure AVC, follow these general steps:

1. Create a flow record by specifying keys and non-key fields to the flow.
2. Create an optional flow exporter by specifying the flow record as an option.
3. Create a flow monitor based on the flow record and flow exporter.
4. Configure WLAN to apply flow monitor in IPv4 input or output direction.

Creating a Flow Record

By default, **wireless avc basic** (flow record) is available. When you click **Apply** from the GUI, then the record is mapped to the flow monitor.

Default flow record cannot be edited or deleted. If you require a new flow record, you need to create one and map it to the flow monitor from CLI.

SUMMARY STEPS

1. **configure terminal**
2. **flow record** *flow_record_name*
3. **description** *string*
4. **match ipv4 protocol**
5. **match ipv4 source address**
6. **match ipv4 destination address**
7. **match transport source-port**
8. **match transport destination-port**
9. **match flow direction**
10. **match application name**
11. **match wireless ssid**
12. **collect counter bytes long**
13. **collect counter packets long**
14. **collect wireless ap mac address**
15. **collect wireless client mac address**
16. **end**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**configure terminal** **Example:** `Switch# configure terminal`	Enters global configuration mode.

Step 2	**flow record** *flow_record_name*
	
	Example:
	`Switch(config)# flow record record1`
	`Switch (config-flow-record)#`
		Enters flow record configuration mode.

Step 3	**description** *string* **Example:** `Switch(config-flow-record)# description IPv4flow`	(Optional) Describes the flow record as a maximum 63-character string.
Step 4	**match ipv4 protocol** **Example:** `Switch (config-flow-record)# match ipv4 protocol`	Specifies a match to the IPv4 protocol.
Step 5	**match ipv4 source address** **Example:** `Switch (config-flow-record)# match ipv4 source address`	Specifies a match to the IPv4 source address-based field.

	Command or Action	Purpose
Step 6	**match ipv4 destination address** **Example:** `Switch (config-flow-record)# match ipv4 destination address`	Specifies a match to the IPv4 destination address-based field.
Step 7	**match transport source-port** **Example:** `Switch (config-flow-record)# match transport source-port`	Specifies a match to the transport layer source-port field.
Step 8	**match transport destination-port** **Example:** `Switch (config-flow-record)# match transport destination-port`	Specifies a match to the transport layer destination-port field.
Step 9	**match flow direction** **Example:** `Switch (config-flow-record)# match flow direction`	Specifies a match to the direction the flow was monitored in.
Step 10	**match application name** **Example:** `Switch (config-flow-record)# match application name`	Specifies a match to the application name.
Step 11	**match wireless ssid** **Example:** `Switch (config-flow-record)# match wireless ssid`	Specifies a match to the SSID name identifying the wireless network.
Step 12	**collect counter bytes long** **Example:** `Switch (config-flow-record)# collect counter bytes long`	Specifies to collect counter fields total bytes.
Step 13	**collect counter packets long** **Example:** `Switch (config-flow-record)# collect counter bytes long`	Specifies to collect counter fields total packets.
Step 14	**collect wireless ap mac address** **Example:** `Switch (config-flow-record)# collect wireless ap mac address`	Specifies to collect the BSSID with MAC addresses of the access points that the wireless client is associated with.

	Command or Action	Purpose
Step 15	**collect wireless client mac address** **Example:** `Switch (config-flow-record)# collect wireless client mac address`	Specifies to collect MAC address of the client on the wireless network.
Step 16	**end** **Example:** `Switch(config)# end`	Returns to privileged EXEC mode. Alternatively, you can also press **Ctrl-Z** to exit global configuration mode.

Creating a Flow Exporter (Optional)

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

SUMMARY STEPS

1. **configure terminal**
2. **flow exporter** *flow_exporter_name*
3. **description** *string*
4. **destination** *{hostname | ip-address}*
5. **transport udp** *port-value*
6. **option application-table timeout** *seconds* **(optional)**
7. **option usermac-table timeout** *seconds* **(optional)**
8. **end**
9. **show flow exporter**
10. **end**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**configure terminal** **Example:** `Switch# configure terminal`	Enters global configuration mode.

Step 2	**flow exporter** *flow_exporter_name*
	
	Example:
	`Switch(config)# flow exporter record1`
	`Switch (config-flow-exporter)#`
		Enters flow exporter configuration mode.

	Command or Action	Purpose
Step 3	**description** *string* **Example:** `Switch(config-flow-exporter)# description IPv4flow`	Describes the flow record as a maximum 63-character string.
Step 4	**destination** *{hostname | ip-address}* **Example:** `Switch (config-flow-exporter) # destination 10.99.1.4`	Specifies the hostname or IPv4 address of the system to which the exporter sends data.
Step 5	**transport udp** *port-value* **Example:** `Switch (config-flow-exporter) # transport udp 2`	Configures a port value for the UDP protocol.
Step 6	**option application-table timeout** *seconds* **(optional)** **Example:** `Switch (config-flow-exporter)# option application-table timeout 500`	(Optional) Specifies application table timeout option. The valid range is from 1 to 86400 seconds.
Step 7	**option usermac-table timeout** *seconds* **(optional)** **Example:** `Switch (config-flow-exporter)# option usermac-table timeout 1000`	(Optional) Specifies wireless usermac-to-username table option. The valid range is from 1 to 86400 seconds.
Step 8	**end** **Example:** `Switch(config)# end`	Returns to privileged EXEC mode. Alternatively, you can also press **Ctrl-Z** to exit global configuration mode.
Step 9	**show flow exporter** **Example:** `Switch # show flow exporter`	Verifies your configuration.
Step 10	**end** **Example:** `Switch(config)# end`	Returns to privileged EXEC mode. Alternatively, you can also press **Ctrl-Z** to exit global configuration mode.

Creating a Flow Monitor

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

SUMMARY STEPS

1. **configure terminal**
2. **flow monitor** *monitor-name*
3. **description** *description*
4. **record** *record-name*
5. **exporter** *exporter-name*
6. **cache timeout** {**active** | **inactive**} **(Optional)**
7. **end**
8. **show flow monitor**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**configure terminal** **Example:** `Switch# configure terminal`	Enters global configuration mode.
Step 2	**flow monitor** *monitor-name* **Example:** `Switch (config)# flow monitor flow-monitor-1`	Creates a flow monitor and enters flow monitor configuration mode.
Step 3	**description** *description* **Example:** `Switch (config-flow-monitor)# description flow-monitor-1`	Creates a description for the flow monitor.
Step 4	**record** *record-name* **Example:** `Switch (config-flow-monitor)# record flow-record-1`	Specifies the name of a recorder that was created previously.
Step 5	**exporter** *exporter-name* **Example:** `Switch (config-flow-monitor)# exporter flow-exporter-1`	Specifies the name of an exporter that was created previously.

Step 6	**cache timeout** {**active**	**inactive**} **(Optional)**
		
		Example:
		`Switch (config-flow-monitor)# cache timeout active 1800`
		
		`Switch (config-flow-monitor)# cache timeout inactive 200`
			Specifies to configure flow cache parameters. You can configure for a time period of 1 to 604800 seconds (optional).
			Note To achieve optimal result for the AVC flow monitor, we recommend you to configure the inactive cache timeout value to be greater than 90 seconds.

	Command or Action	Purpose
Step 7	**end** **Example:** `Switch(config)# end`	Returns to privileged EXEC mode. Alternatively, you can also press **Ctrl-Z** to exit global configuration mode.
Step 8	**show flow monitor** **Example:** `Switch # show flow monitor`	Verifies your configuration.

Configuring WLAN to Apply Flow Monitor in IPV4 Input/Output Direction

SUMMARY STEPS

1. **configure terminal**
2. **wlan** *wlan-id*
3. **ip flow monitor** *monitor-name* **{input | output}**
4. **end**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**configure terminal** **Example:** `Switch# configure terminal`	Enters global configuration mode.
Step 2	**wlan** *wlan-id* **Example:** `Switch (config) # wlan 1`	Enters WLAN configuration submode. For *wlan-id*, enter the WLAN ID. The range is 1 to 64.
Step 3	**ip flow monitor** *monitor-name* **{input | output}** **Example:** `Switch (config-wlan) # ip flow monitor flow-monitor-1 input`	Associates a flow monitor to the WLAN for input or output packets.
Step 4	**end** **Example:** `Switch(config)# end`	Returns to privileged EXEC mode. Alternatively, you can also press **Ctrl-Z** to exit global configuration mode.

Configuring Application Visibility and Control (GUI)

You can apply the default flow record (**wireless avc basic**) to the default flow monitor (**wireless-avc-basic**).

If you are using the flow record and flow monitor you have created, then the record name and monitor name should be same. This is specific only for configuring AVC from GUI and not for the CLI configuration.

You can use the flow monitor you have created either for upstream or downstream, or both, but ensure that you use the same record name while mapping with the flow monitor.

Step 1 Choose **Configuration** > **Wireless** > **WLAN**.
The **WLAN** page appears.

Step 2 Click on corresponding WLAN ID to open WLAN Edit page and click **AVC**.
The **Application Visibility** page appears.

a) Select the **Application Visibility Enabled** check box to enable AVC on a WLAN.
b) In the **Upstream Profile** text box, enter the name of the AVC profile.
c) In the **Downstream Profile** text box, enter the name of the AVC profile.

To enable AVC, you need to enter the profile names for the upstream and downstream profiles. The profile names are the flow monitor names. By default, the flow monitor names (**wireless-avc-basic**) appear in the **Upstream Profile** and **Downstream Profile** text boxes. For the default flow monitor, the default flow record (**wireless avc basic**) will be taken. The default flow record is generated by the system and is available.

You can change the profile names for the upstream and downstream profiles but ensure that the same flow records are available for the flow monitors.

The upstream and downstream profiles can have different profile names but there should be flow records available for the flow monitors.

Step 3 Click **Apply** to apply AVC on the WLAN.

Step 4 Uncheck the **Application Visibility Enabled** check box on the **WLAN** page.
AVC is disabled on WLAN.

Step 5 Click **Apply**.

Monitoring Application Visibility and Control

Monitoring Application Visibility and Control (CLI)

This section describes the new commands for application visibility.

The following commands can be used to monitor application visibility on the switch and access points.

Table 1: Monitoring Application Visibility Commands on the switch

Command	Purpose

show avc client *client-mac* **top** *n* **application** [**aggregate** | **upstream** | **downstream**]	Displays information about top "N" applications for the given client MAC.
show avc wlan *ssid* **top** *n* **application** [**aggregate** | **upstream** | **downstream**]	Displays information about top "N" applications for the given SSID.
show wlan id *wlan-id*	Displays information whether AVC is enabled or disabled on a particular WLAN.
show flow monitor *flow_monitor_name* **cache**	Displays information about flow monitors.

Table 2: Clearing Application Visibility Statistics Commands

Command	Purpose
clear avc client *mac* **stats**	Clears the statistics per client.
clear avc wlan *ssid-name* **stats**	Clears the statistics per WLAN.

Monitoring Application Visibility and Control (GUI)

You can view AVC information on a WLAN in a single shot using a **AVC on WLAN** pie chart on the **Home** page of the switch. The pie chart displays the AVC data (Aggregate - Application Cumulative usage %) of the first WLAN. In addition, the top 5 WLANs based on clients are displayed first. Click on any one of the WLANs to view the corresponding pie chart information. If AVC is not enabled on the first WLAN, then the **Home** page does not display the AVC pie chart.

Step 1 Choose **Monitor** > **Controller** > **AVC** > **WLANs**.
The **WLANs** page appears.

Step 2 Click the corresponding WLAN profile.
The **Application Statistics** page appears.

From the **Top Applications** drop-down list, choose the number of top applications you want to view and click **Apply**. The valid range is between 5 to 30, in multiples of 5.

a) On the Aggregate, Upstream, and Downstream tabs, you can view the application cumulative and last 90 seconds statistics and usage percent with the following fields:

- Application name
- Packet count
- Byte count
- Average packet size
- usage (%)

Step 3 Choose **Monitor** > **Clients** > **Client Details** > **Clients**.
The **Clients** page appears.

Step 4 Click **Client MAC Address** and then click **AVC Statistics** tab.
The **Application Visibility** page appears.

a) On the Aggregate, Upstream, and Downstream tabs, you can view the application cumulative and last 90 seconds statistics and usage percent with the following fields:

- Application name
- Packet count
- Byte count
- Average packet size
- usage (%)

Examples: Application Visibility and Control Configuration

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:

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


Switch# configure terminal
Switch# flow monitor fm_v4
Switch(config-flow-monitor)# record fr_v4
Switch(config-flow-monitor)# cache timeout active 1800
Switch(config)#end


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

Additional References for Application Visibility and Control

Related Documents

Related Topic	Document Title
System management commands	*System Management Command Reference Guide, Cisco IOS XE Release 3SE (Cisco WLC 5700 Series)*
Flexible NetFlow configuration	*Flexible NetFlow Configuration Guide, Cisco IOS XE Release 3SE (Cisco WLC 5700 Series)*
Flexible NetFlow commands	*Flexible NetFlow Command Reference, Cisco IOS XE Release 3SE (Cisco WLC 5700 Series)*

Standards and RFCs

Standard/RFC	Title
None	—

MIBs

MIB	MIBs Link
All supported MIBs for this release.	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

Technical Assistance

Description	Link
The Cisco Support website provides extensive online resources, including documentation and tools for troubleshooting and resolving technical issues with Cisco products and technologies. To receive security and technical information about your products, you can subscribe to various services, such as the Product Alert Tool (accessed from Field Notices), the Cisco Technical Services Newsletter, and Really Simple Syndication (RSS) Feeds. Access to most tools on the Cisco Support website requires a Cisco.com user ID and password.	http://www.cisco.com/support

Feature History and Information For Application Visibility and Control

Release	Feature Information
Cisco IOS XE 3.3SE	This feature was introduced.