Configure QoS (BDRL) Rate Limit on Catalyst 9800 Wireless Controllers with AAA Override

Contents

Introduction

This document describes a configuration example for Bi Directional Rate Limit (BDRL) on Catalyst 9800 Series Wireless Controllers.

Prerequisites

Requirements

Cisco recommends that you have knowledge of these topics:

- Catalyst Wireless 9800 configuration model
- AAA with Cisco Identity Service Engine (ISE)

Components Used

The information in this document is based on these software and hardware versions:

- Cisco Catalyst 9800-CL Wireless Controller on version 16.12.1s

- Identity Service Engine on version 2.2

The information in this document was created from the devices in a specific lab environment. All of the devices used in this document started with a cleared (default) configuration. If your network is live, ensure that you understand the potential impact of any command.

Background Information

QoS in 9800 WLC platform uses the same concepts and components as the Catalyst 9000 platforms.

This section provides a global overview of how these components work and how can they be configured to achieve different results.

In essence, QoS recursion works like this:

1. Class-Map: Identifies a certain type of traffic. Class-maps can leverage the Application Visibility and Control (AVC) engine.

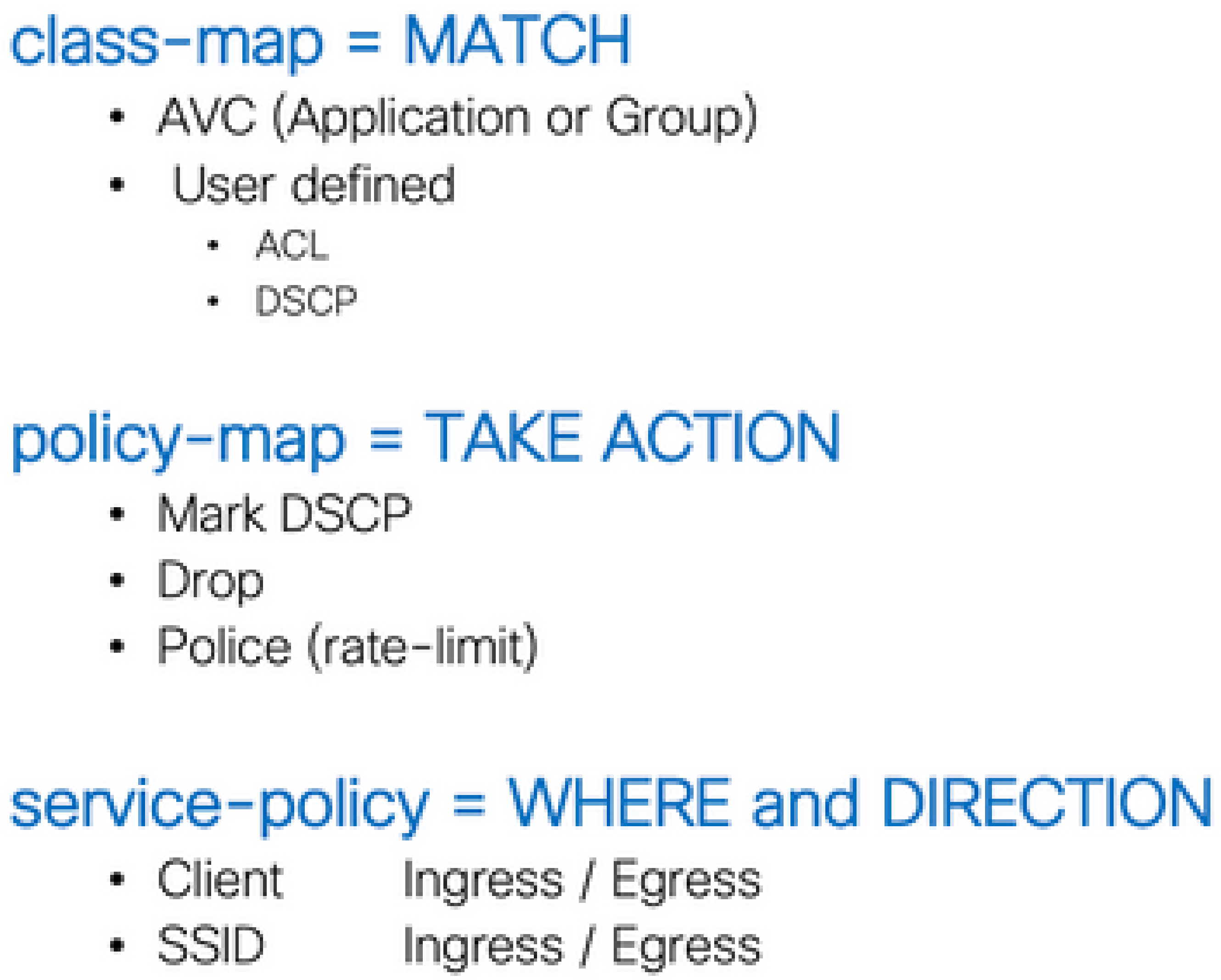
Also, the user can define custom Class-maps to identify traffic that matches a Access Control Lists (ACL) or Differentiated Services Code Point (DSCP)

2. Policy-Map: Are policies that apply to Class-maps.
These policies could mark DSCP, drop or rate limit the traffic that matches the Class-map

4. Service-Policy: Policy-maps can be applied on the Policy Profile of an SSID or Per-Client on a certain direction with the service-policy command.

3. (Optional) Table-Map: They are used to convert one type of mark to another, for instance, CoS to DCSP.

Note: In the Table-map, specify the values to be changed (4 to 32); in the policy-map, the technology is specified (COS to DSCP).



class-map = MATCH

- AVC (Application or Group)
- User defined
  - ACL
  - DSCP

policy-map = TAKE ACTION

- Mark DSCP
- Drop
- Police (rate-limit)

service-policy = WHERE and DIRECTION

- Client Ingress / Egress
- SSID Ingress / Egress

Note: In case two or more policies are applicable per target, policy resolution is chosen based on this priority ranking:

- AAA Override (highest)
- Native profiling (Local policies)
- Configured Policy
- Default Policy (lowest)

More details can be found in the official QoS configuration guide for 9800

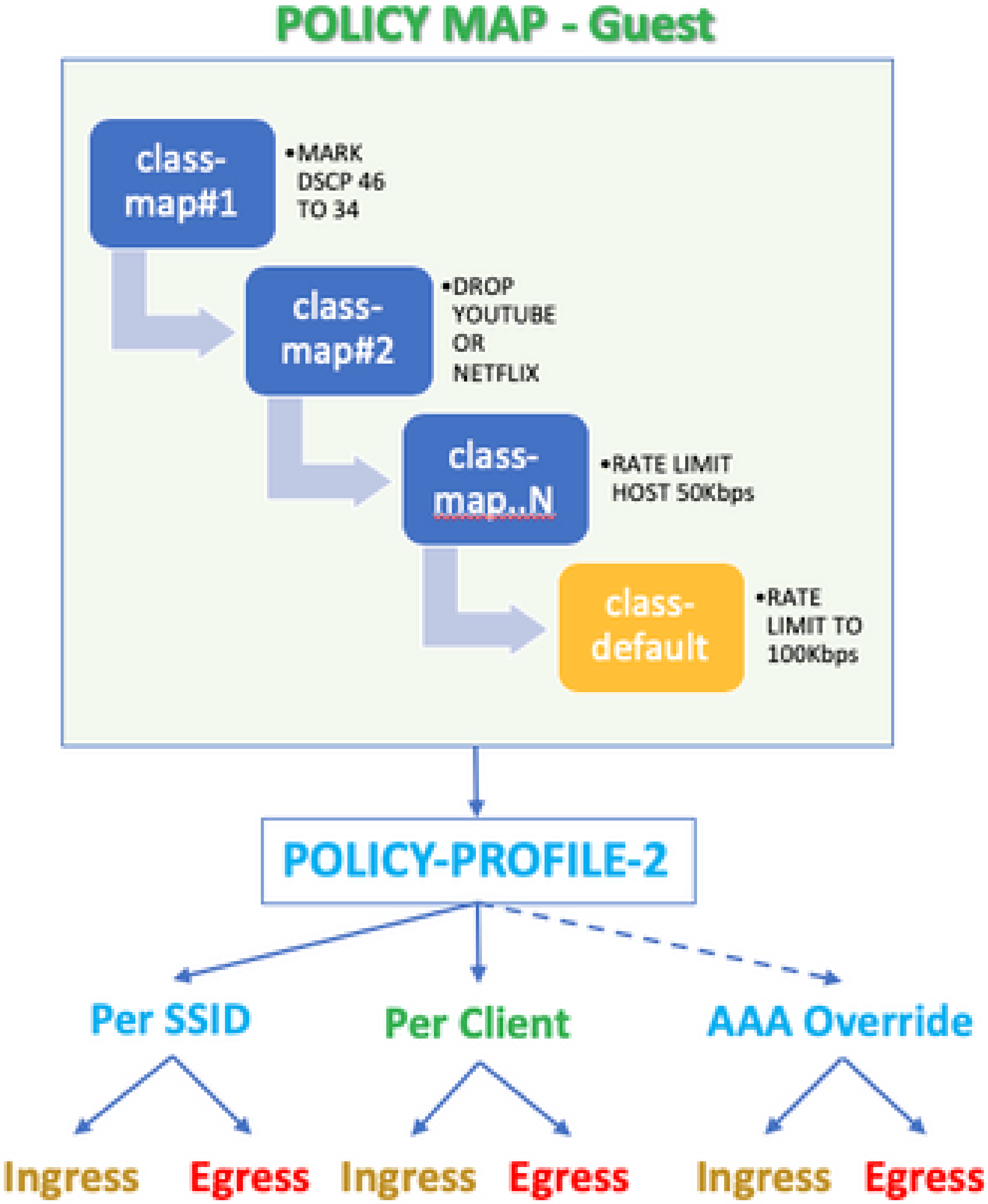
Additional information about QoS theory can be found in the 9000 series QoS configuration guide

Example: Guest and Corp QoS Policies

This example demonstrates how the explained QoS components apply in a real world scenario.

The intention is to configure a QoS Policy for guest that:

- Remarks DSCP
- Drops Youtube and Netflix video
- Rate Limits a host specified in an ACL to 50Kbps
- Rate Limits all other traffic to 100Kbps



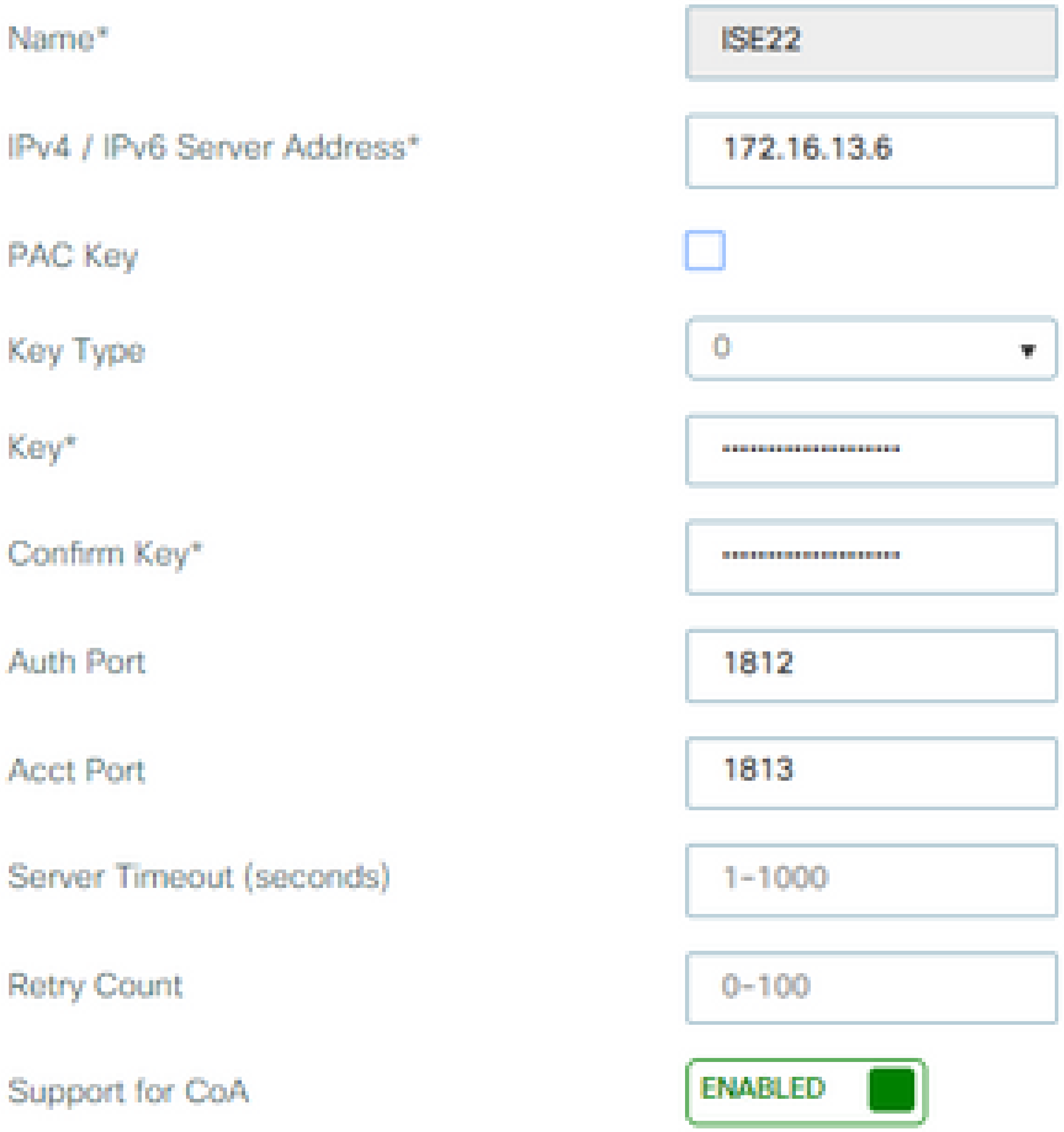
For the example, the QoS Policy must be applied Per SSID in both directions Ingress and Egress to the Policy Profile that links to the Guest WLAN.

Configure

AAA server and Method List

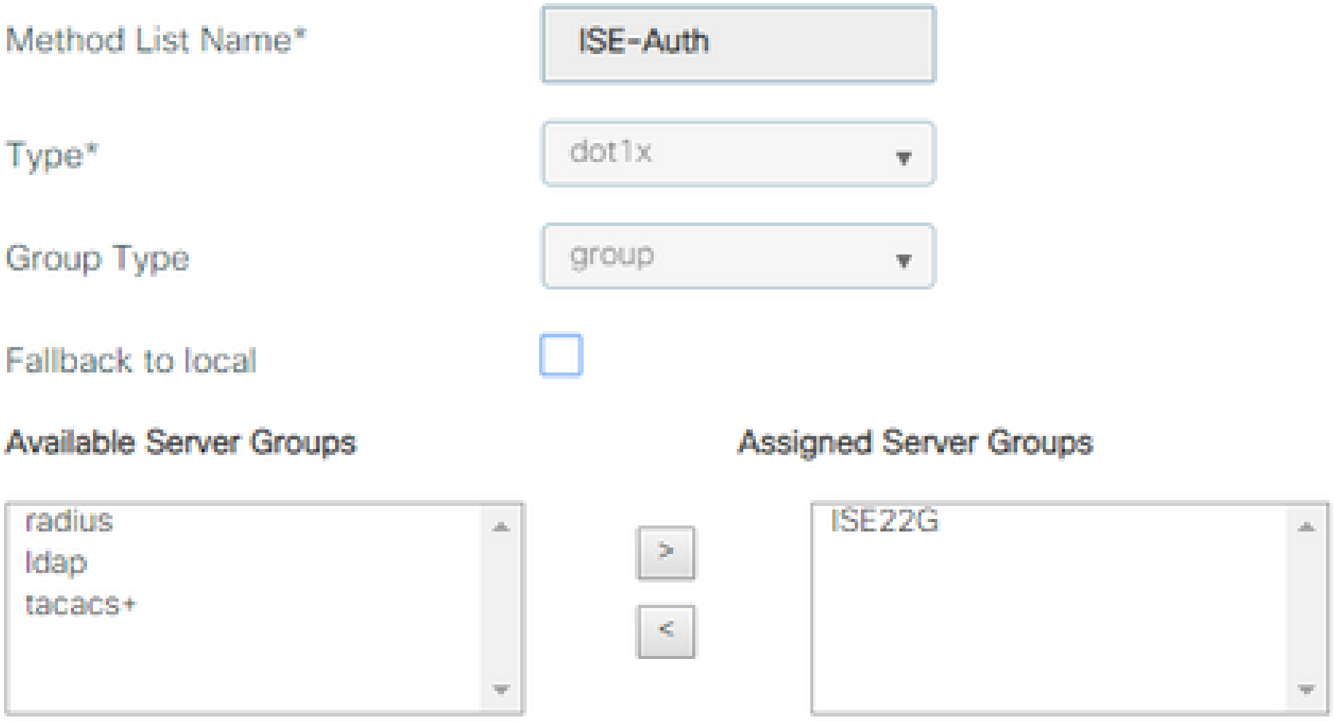
Step 1. Navigate to **Configuration** > **Security** > **AAA** > **Authentication** > **Servers/Groups** and select **+Add.**

Enter the AAA server name, IP address and key, which has to match the shared secret under **Administration** > **Network Resources** > **Network Devices** on ISE.



Name*	ISE22
IPv4 / IPv6 Server Address*	172.16.13.6
PAC Key	□
Key Type	0 ▾
Key*	••••••••••••••••••••
Confirm Key*	••••••••••••••••••••
Auth Port	1812
Acct Port	1813
Server Timeout (seconds)	1-1000
Retry Count	0-100
Support for CoA	ENABLED

Step 2. Navigate to **Configuration** > **Security** > **AAA** > **Authentication** > **AAA Method List** and select **+Add.** Select the Assigned Server Groups from the Available Server Groups.



Method List Name* ISE-Auth

Type* dot1x

Group Type group

Fallback to local □

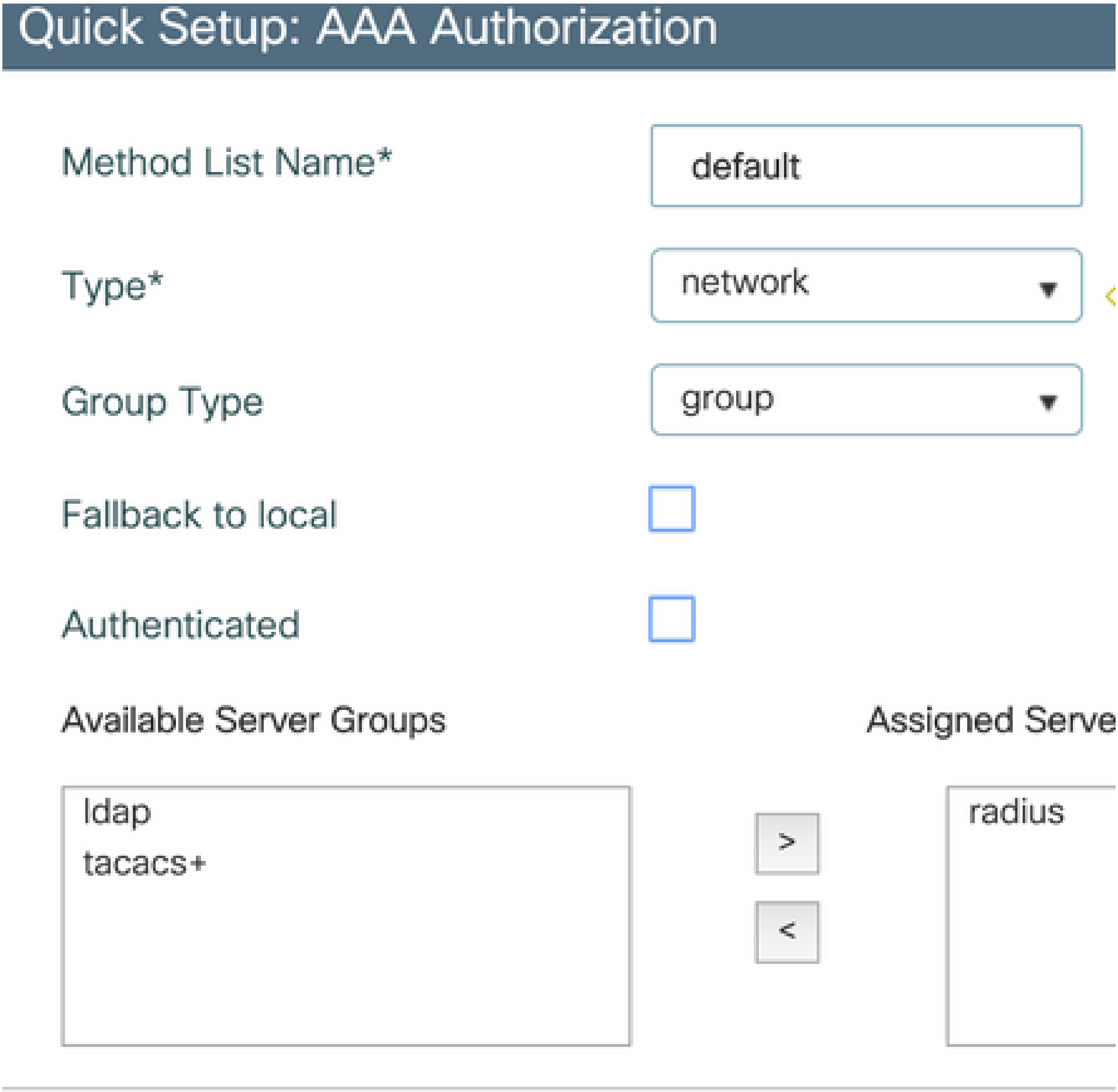
Available Server Groups

radius
ldap
tacacs+

Assigned Server Groups

ISE22G

Step 3. Navigate to **Configuration** > **Security** > **AAA** > **Authorization** > **AAA method List** and select **Add.** Chose the default method and "network" as the type.



Quick Setup: AAA Authorization

Method List Name* default

Type* network

Group Type group

Fallback to local □

Authenticated □

Available Server Groups

ldap
tacacs+

Assigned Serve

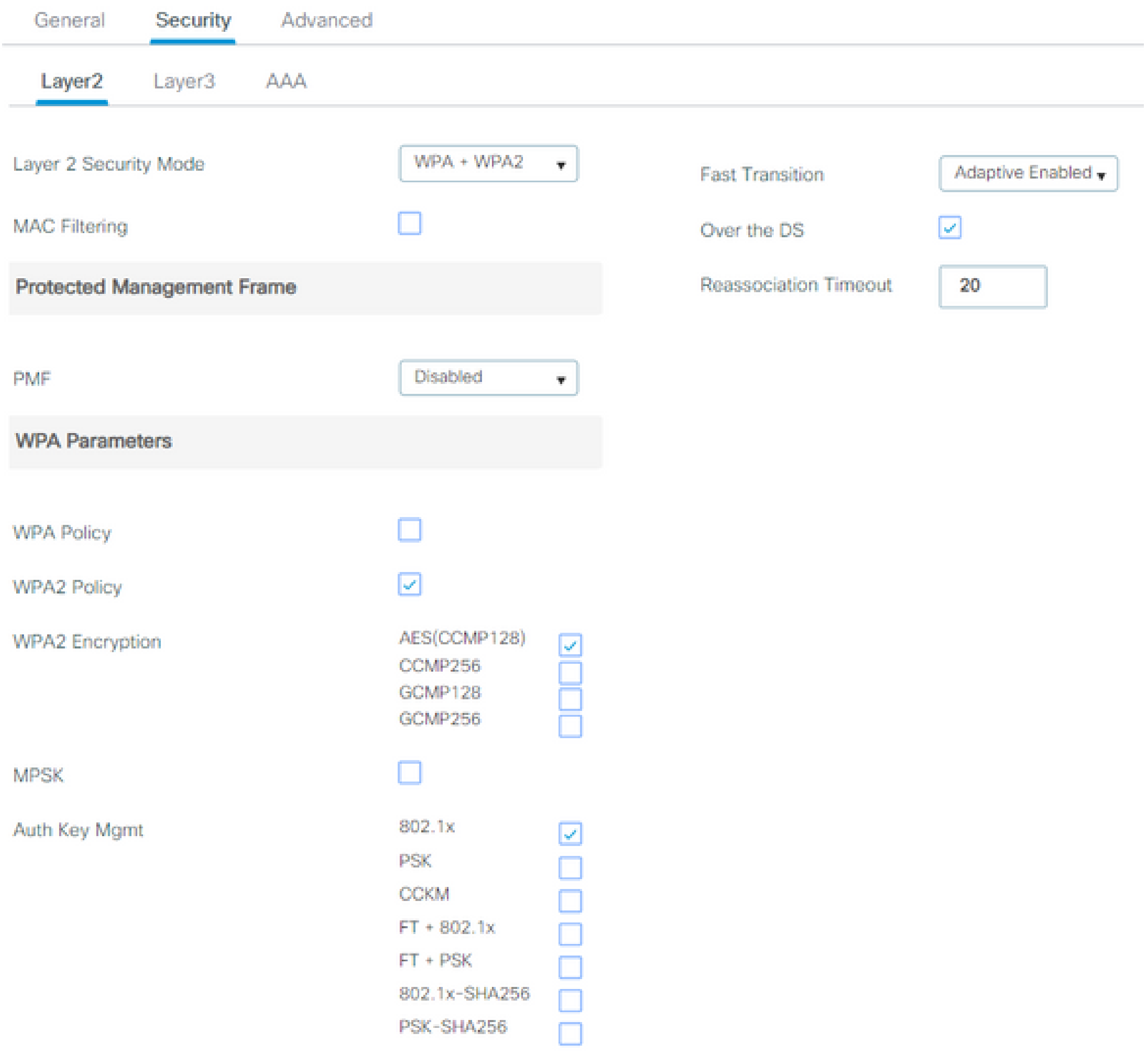
radius

This is required for the controller to apply the authorization attributres (for example the QoS policy here) returned by the AAA server. Otherwise, the policy received from RADIUS is not applied.

WLAN Policy, Site Tag and AP Tag

Step 1. Navigate to **Configuration** > **Wireless Setup** > **Advanced** > **Start Now** > **WLAN Profile** and select **+Add** to create a new WLAN. Configure the SSID, Profile Name, WLAN ID, and set status to enabled.

Then, navigate to **Security** > **Layer 2** and configure the Layer 2 authentication parameters:



Layer 2 Security Mode: WPA + WPA2

MAC Filtering: □

Protected Management Frame

PMF: Disabled

WPA Parameters

WPA Policy: □

WPA2 Policy: ☑

WPA2 Encryption:
- AES(CCMP128) ☑
- CCMP256 □
- GCMP128 □
- GCMP256 □

MPSK: □

Auth Key Mgmt:
- 802.1x ☑
- PSK □
- CCKM □
- FT + 802.1x □
- FT + PSK □
- 802.1x-SHA256 □
- PSK-SHA256 □

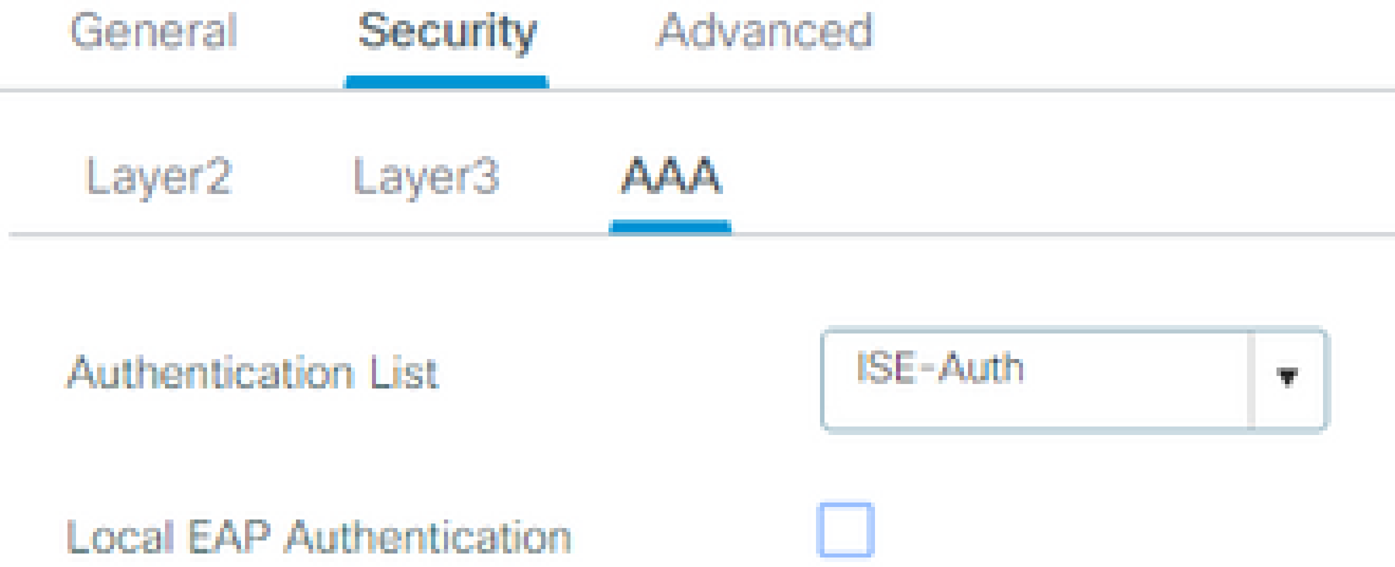
Fast Transition: Adaptive Enabled

Over the DS: ☑

Reassociation Timeout: 20

The SSID security does not have to be 802.1x as a requisite for QoS, yet is used in this configuration example for AAA override.

Step 2. Navigate to **Security** > **AAA** and select the AAA server in the **Authentication List** drop-down box.

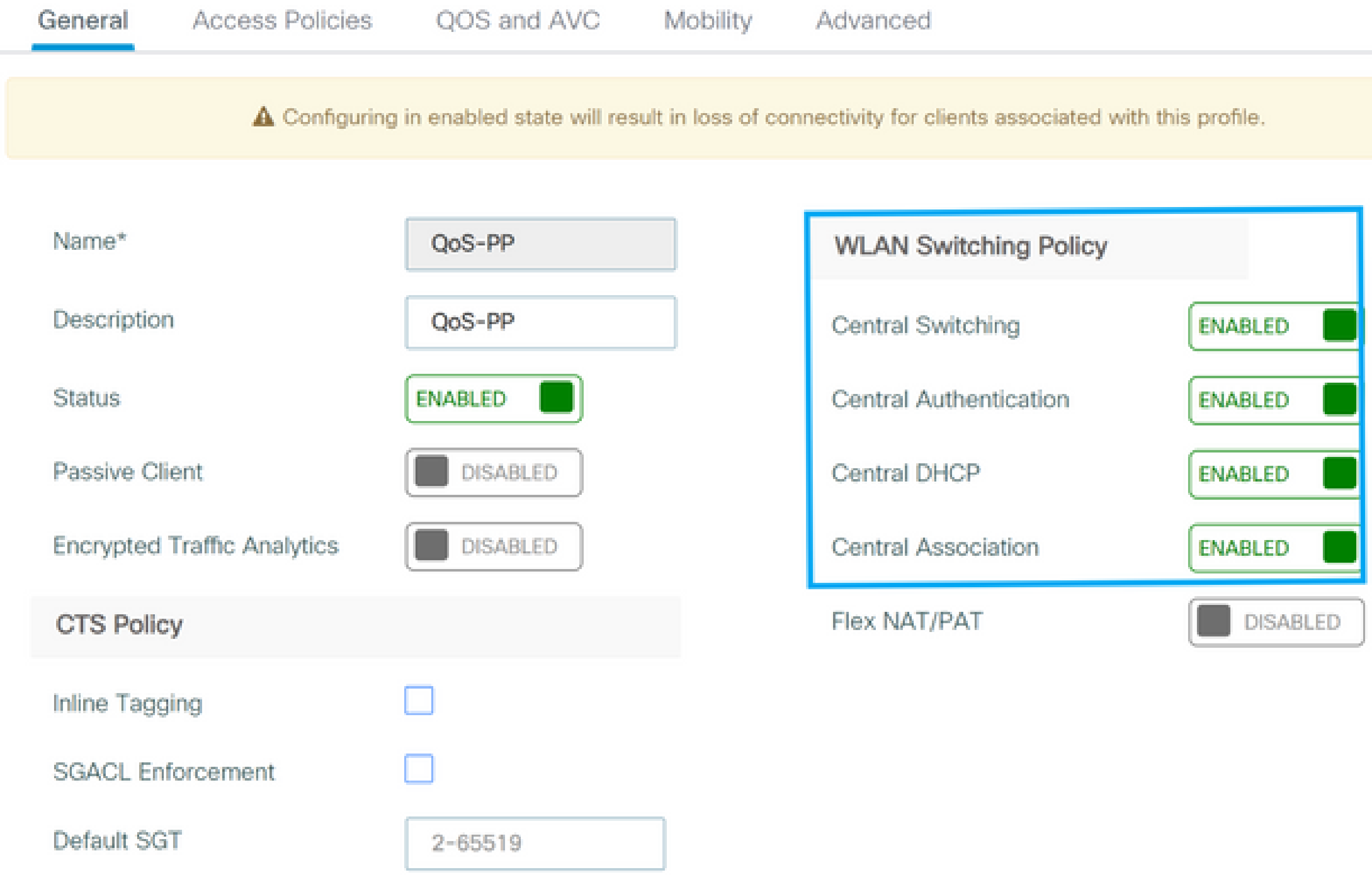


Authentication List: ISE-Auth

Local EAP Authentication: □

Step 3. Select **Policy Profile** and select **+Add.** Configure the Policy Profile name.

Set the Status as Enabled; also enable Central Switching, Authentication, DHCP and association:



⚠ Configuring in enabled state will result in loss of connectivity for clients associated with this profile.

Name*: QoS-PP

Description: QoS-PP

Status: ENABLED

Passive Client: DISABLED

Encrypted Traffic Analytics: DISABLED

CTS Policy

Inline Tagging: □

SGACL Enforcement: □

Default SGT: 2-65519

WLAN Switching Policy

Central Switching: ENABLED

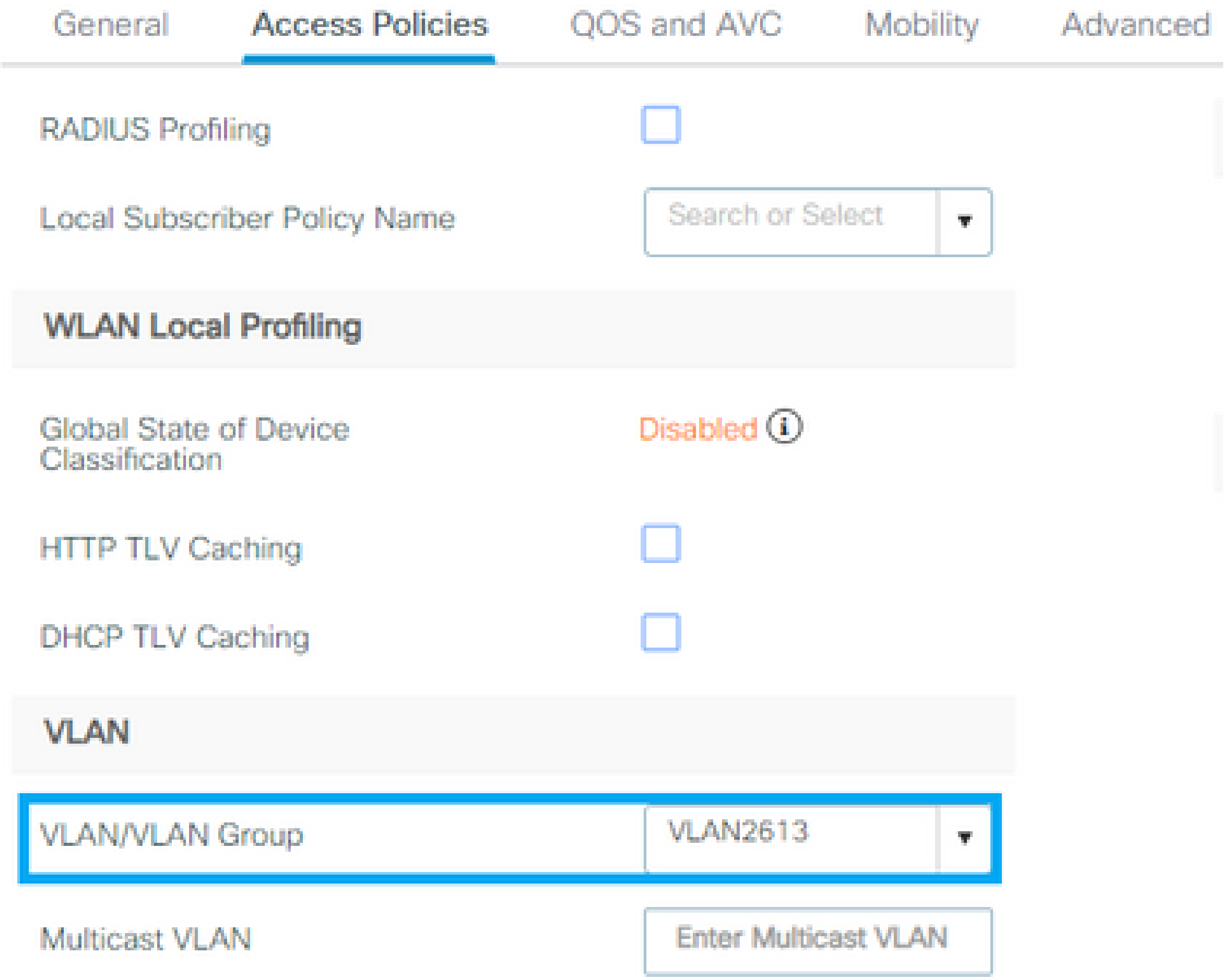
Central Authentication: ENABLED

Central DHCP: ENABLED

Central Association: ENABLED

Flex NAT/PAT: DISABLED

Step 4. Navigate to **Access Policies** and configure the VLAN the wireless client is assigned to when client connects to the SSID:



RADIUS Profiling □

Local Subscriber Policy Name: Search or Select ▾

WLAN Local Profiling

Global State of Device Classification: Disabled ⓘ

HTTP TLV Caching □

DHCP TLV Caching □

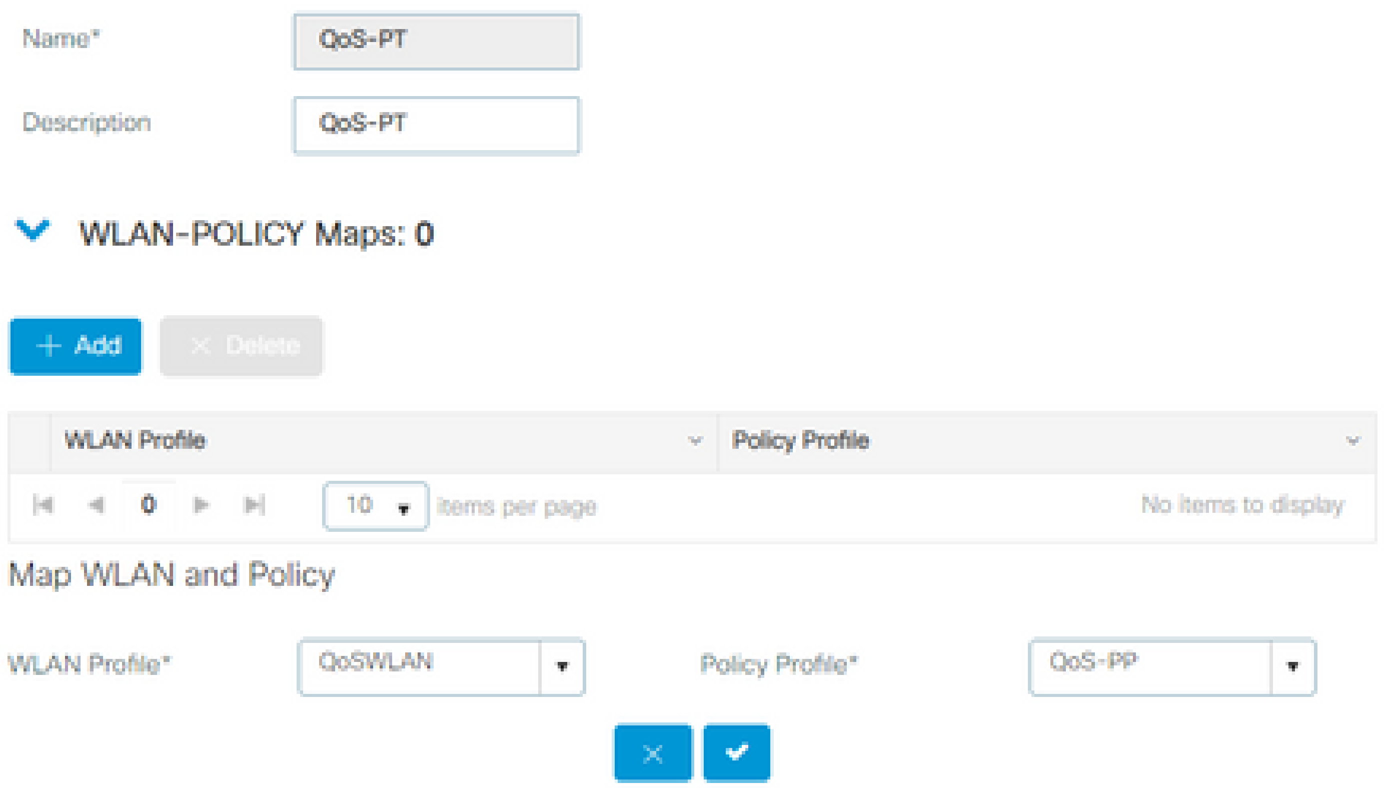
VLAN

VLAN/VLAN Group: VLAN2613 ▾

Multicast VLAN: Enter Multicast VLAN

Step 5. Select **Policy Tag** and select **+Add.** Configure the Policy Tag name.

Under **WLAN-Policy Maps,** on **+Add,** select the **WLAN Profile** and **Policy Profile** from the drop down menus, select the check for the map to be configured.



Name* QoS-PT

Description QoS-PT

WLAN-POLICY Maps: 0

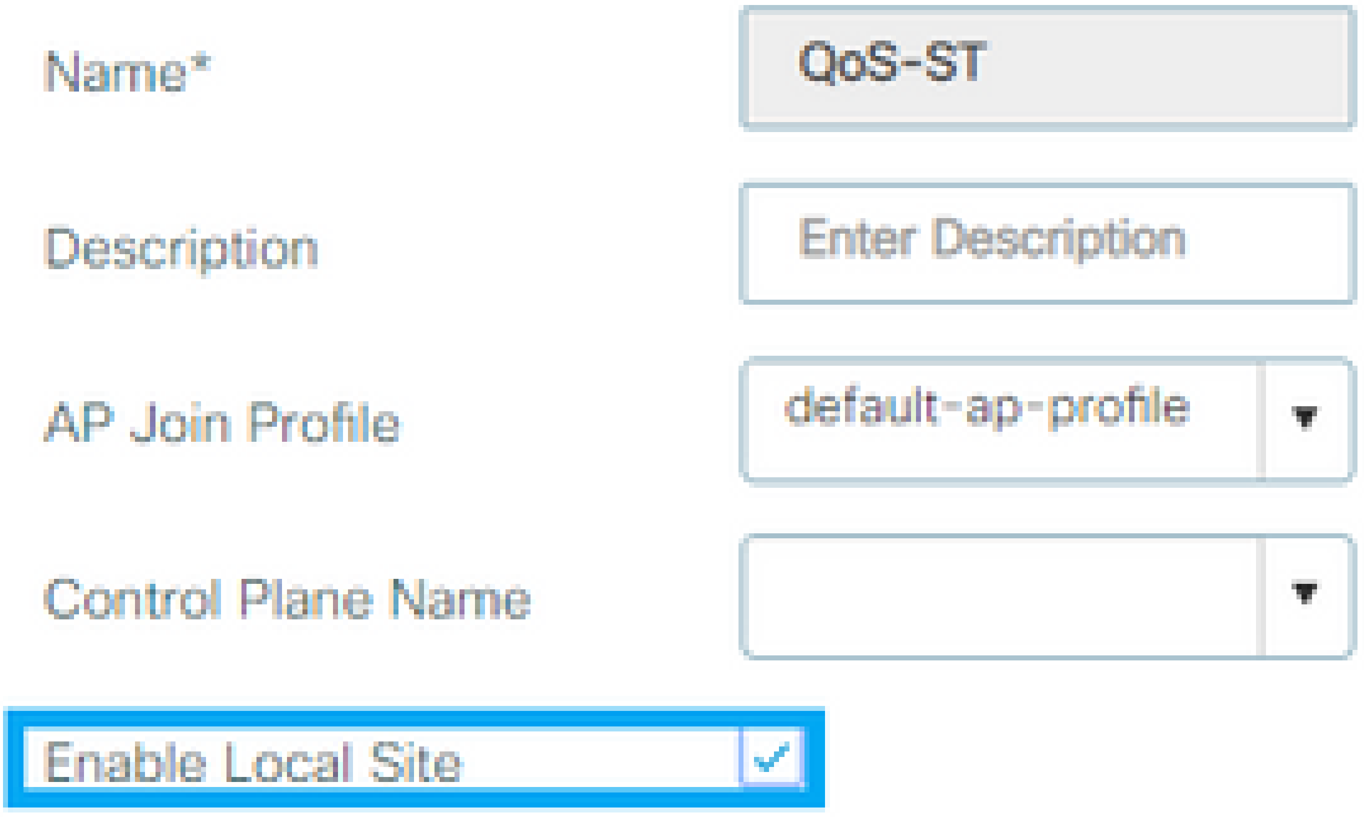
WLAN Profile	Policy Profile

Map WLAN and Policy

WLAN Profile* QoSWLAN

Policy Profile* QoS-PP

Step 6. Select **Site Tag** and select **+Add.** Check the **Enable Local Site** box for the APs to operate in Local Mode (or leave it uncheked for FlexConnect)**:**



Name* QoS-ST

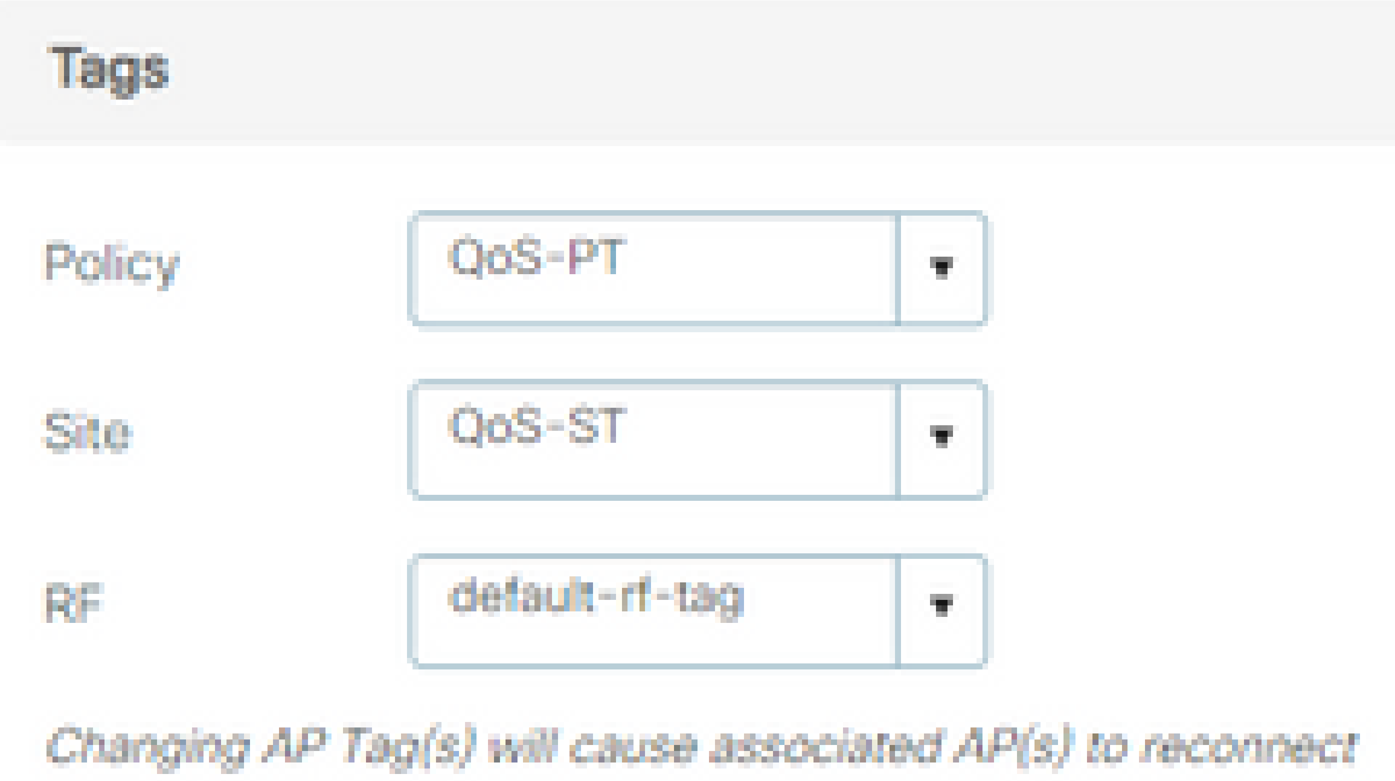
Description Enter Description

AP Join Profile default-ap-profile

Control Plane Name

Enable Local Site ☑

Step 7. Select **Tag APs**, choose the APs and add the Policy, Site and RF tag:



Tags

Policy: QoS-PT

Site: QoS-ST

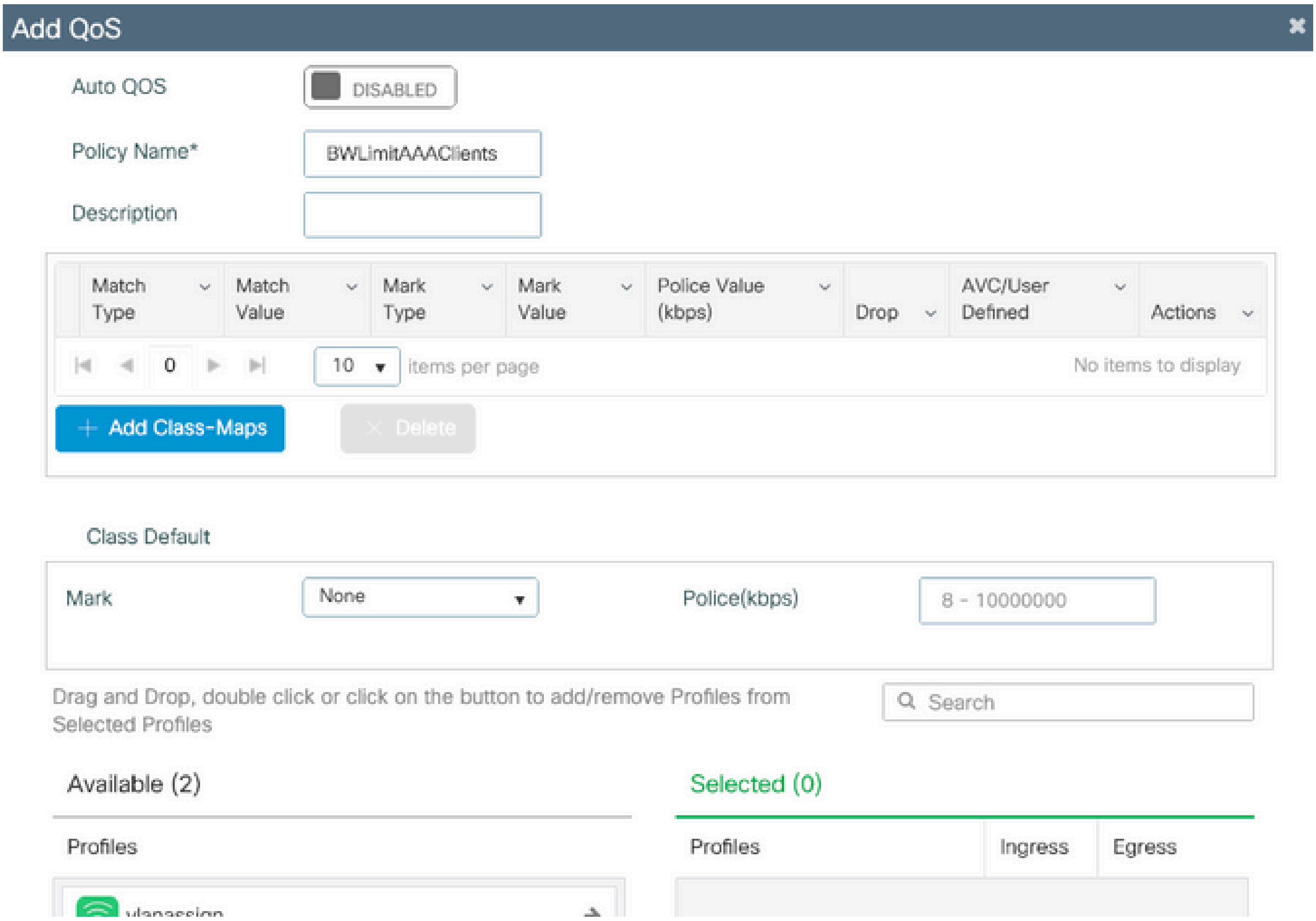
RF: default-rf-tag

Changing AP Tag(s) will cause associated AP(s) to reconnect

QoS

Step 1. Navigate to **Configuration** > **Services** > **QoS** and select **+Add** to create a QoS Policy.

Name it (for this example : BWLimitAAAClients).



Add QoS

Auto QOS: DISABLED

Policy Name*: BWLimitAAAClients

Description:

Match Type	Match Value	Mark Type	Mark Value	Police Value (kbps)	Drop	AVC/User Defined	Actions

0 · 10 items per page · No items to display

Class Default

Mark: None

Police(kbps): 8 - 10000000

Drag and Drop, double click or click on the button to add/remove Profiles from Selected Profiles

Available (2)

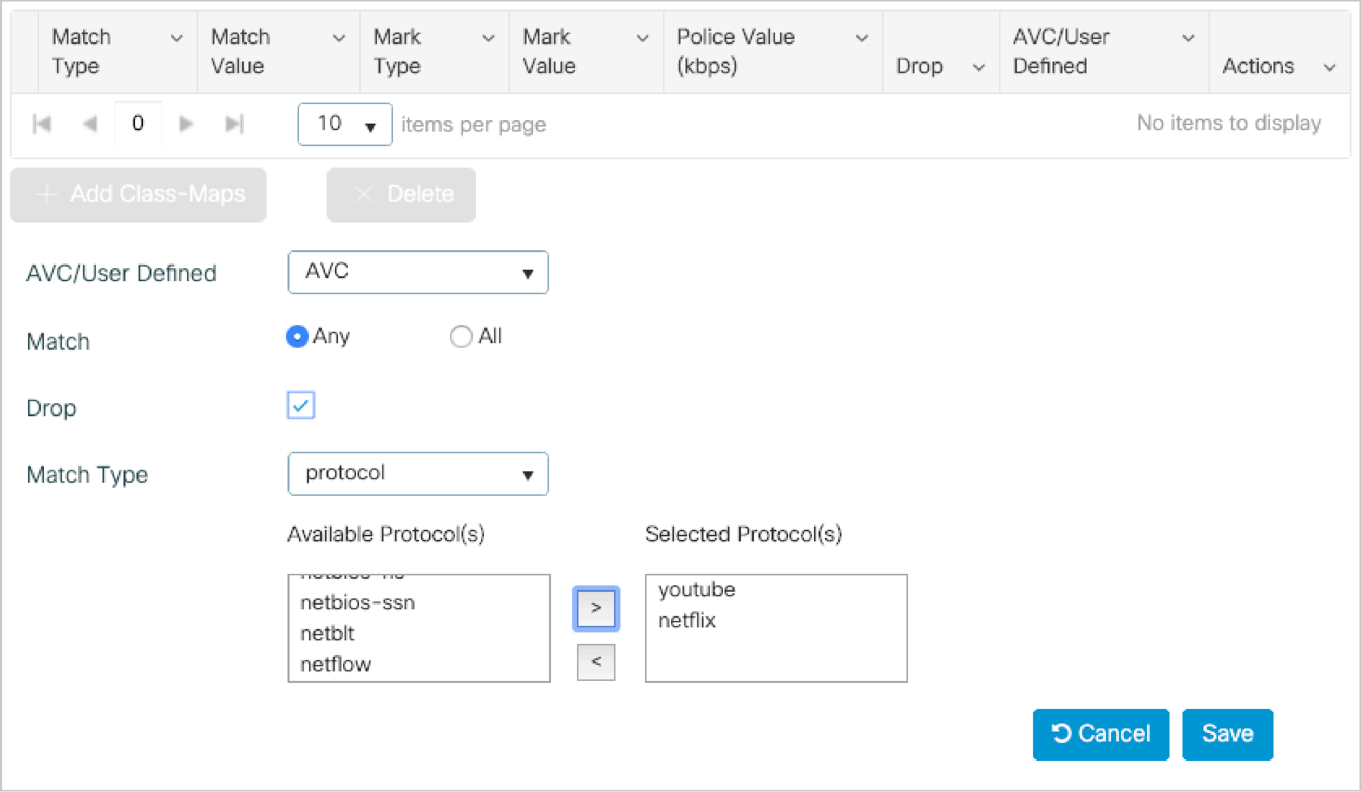
Profiles

vlanassign

Selected (0)

Profiles	Ingress	Egress

Step 2. Add a class map to drop Youtube and Netflix. Click on **Add Class-Maps**. Select **AVC**, match **any**, **drop** action and chose both protocols.



Match Type	Match Value	Mark Type	Mark Value	Police Value (kbps)	Drop	AVC/User Defined	Actions

0 · 10 items per page · No items to display

AVC/User Defined: AVC

Match: ● Any ○ All

Drop: ☑

Match Type: protocol

Available Protocol(s)

netbios-ssn
netblt
netflow

Selected Protocol(s)

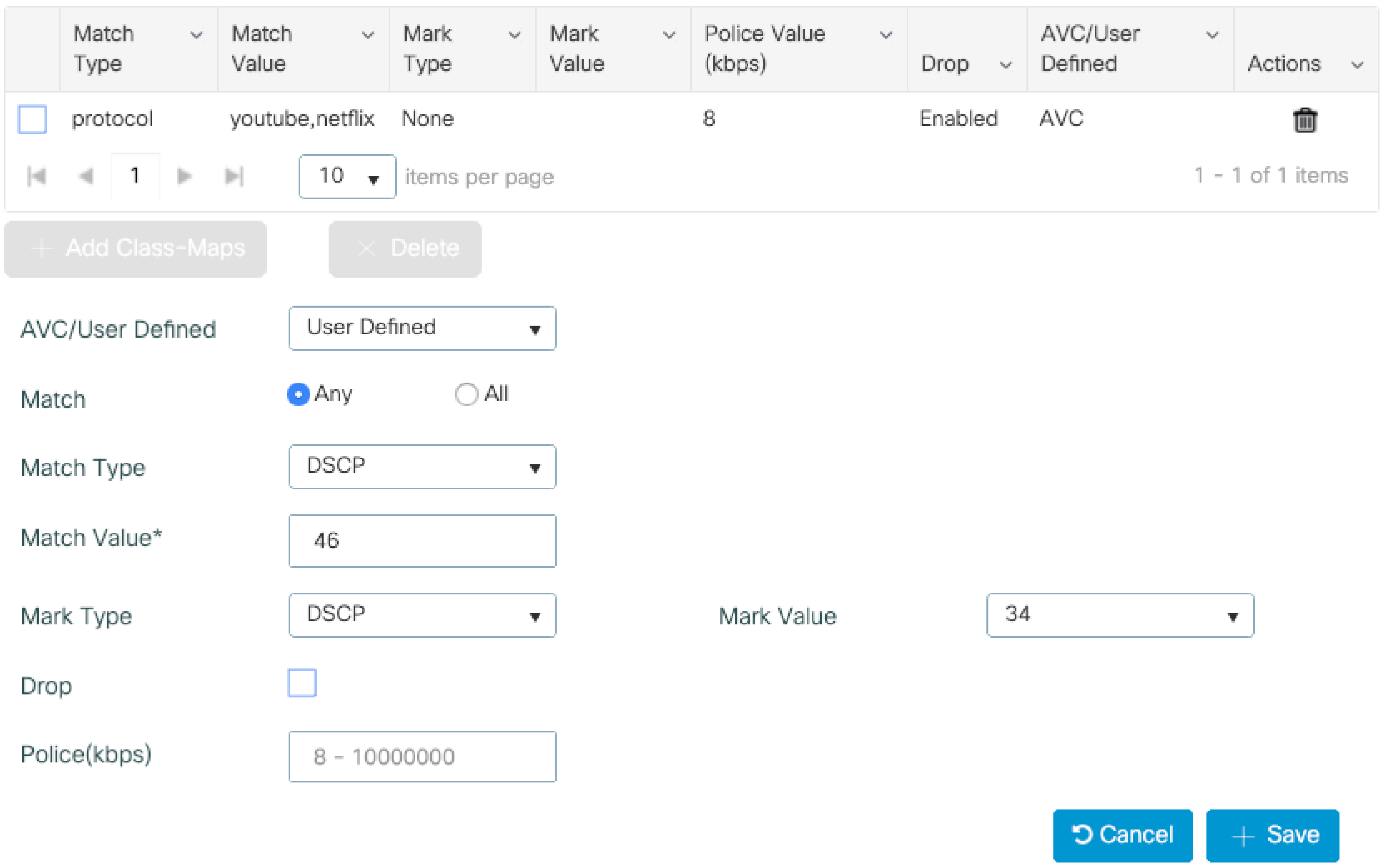
youtube
netflix

Hit **Save.**

Step 3. Add a class map that remarks DSCP 46 to 34.

Click **Add Class-Maps**.

- Match **any, User Defined**
- Match type **DSCP**
- Match value **46**
- Mark type **DSCP**
- Mark value **34**



	Match Type	Match Value	Mark Type	Mark Value	Police Value (kbps)	Drop	AVC/User Defined	Actions
□	protocol	youtube,netflix	None		8	Enabled	AVC	🗑

1 | 10 items per page | 1 - 1 of 1 items

AVC/User Defined	User Defined
Match	● Any ○ All
Match Type	DSCP
Match Value*	46
Mark Type	DSCP
Mark Value	34
Drop	□
Police(kbps)	8 - 10000000

.

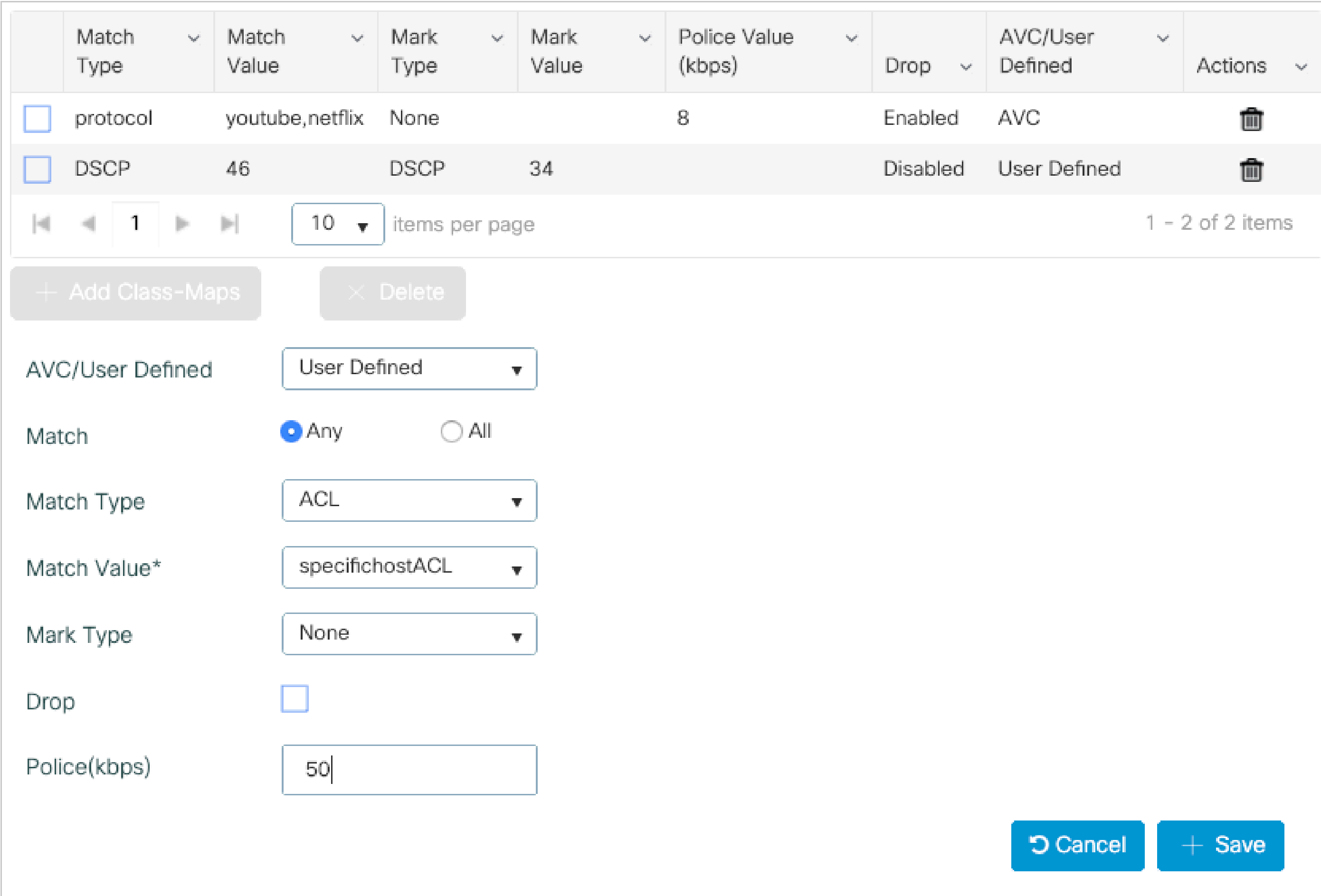
Hit **Save.**

Step 4. To define a class map that rules traffic to a specific host, create an ACL for it.

Click **Add Class-Maps**,

Choose **User Defined**, match **any,** match type **ACL**, chose your ACL name (here **specifichostACL**), mark type **none** and chose the rate limit value.

Click **Save.**

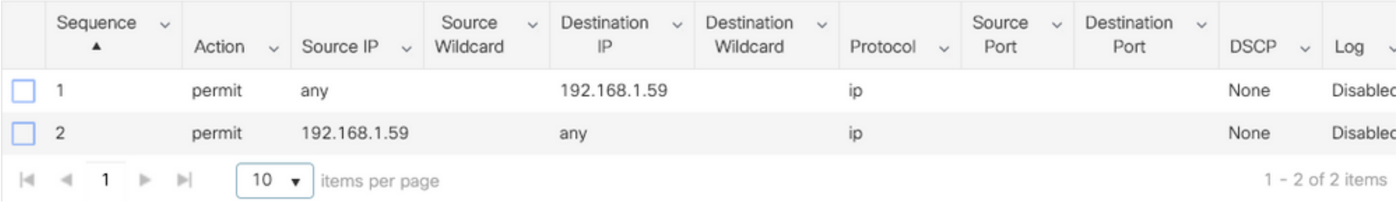


□	Match Type	Match Value	Mark Type	Mark Value	Police Value (kbps)	Drop	AVC/User Defined	Actions
□	protocol	youtube,netflix	None		8	Enabled	AVC	🗑
□	DSCP	46	DSCP	34		Disabled	User Defined	🗑

1 · 10 items per page · 1 - 2 of 2 items

AVC/User Defined	User Defined
Match	● Any ○ All
Match Type	ACL
Match Value*	specifichostACL
Mark Type	None
Drop	□
Police(kbps)	50

Here is an example of ACL that we use to identify a specific host traffic :

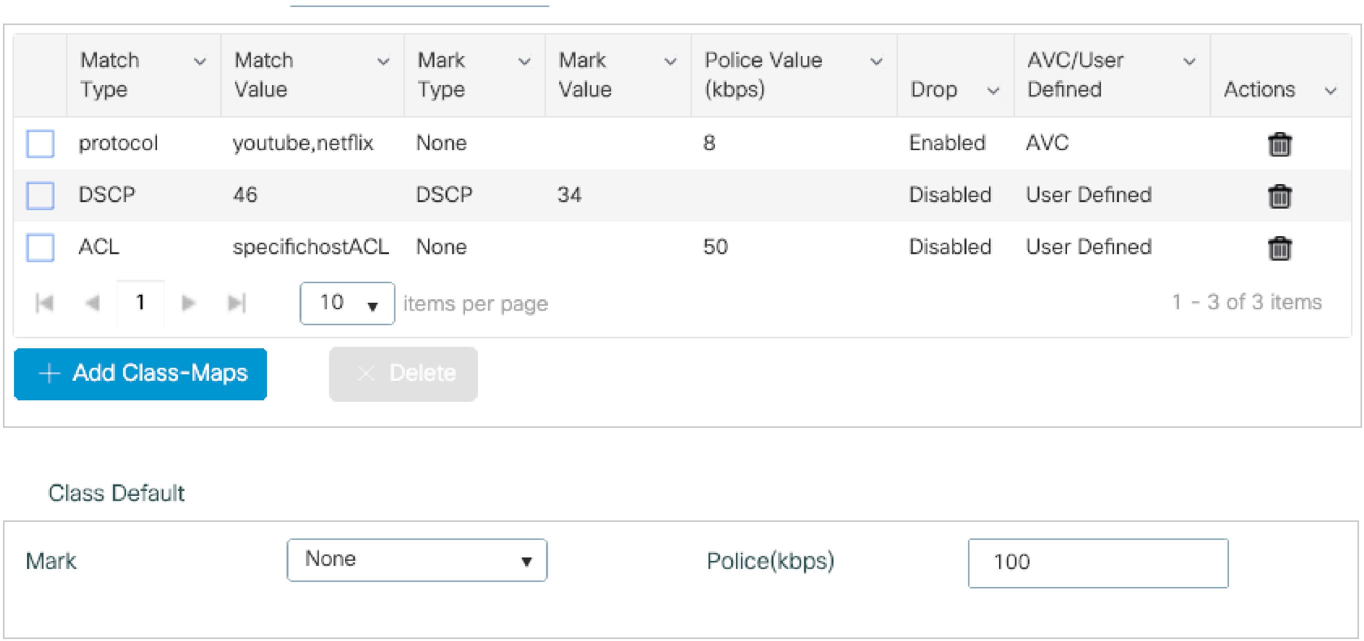


□	Sequence	Action	Source IP	Source Wildcard	Destination IP	Destination Wildcard	Protocol	Source Port	Destination Port	DSCP	Log
□	1	permit	any		192.168.1.59		ip			None	Disablec
□	2	permit	192.168.1.59		any		ip			None	Disablec

1 · 10 items per page · 1 - 2 of 2 items

Step 5. Under the class maps frame, use the default class to set the rate limit for all the other traffic.

This sets a rate limit on all the client traffic that is not targeted by one of the rules above.



	Match Type	Match Value	Mark Type	Mark Value	Police Value (kbps)	Drop	AVC/User Defined	Actions
□	protocol	youtube,netflix	None		8	Enabled	AVC	🗑
□	DSCP	46	DSCP	34		Disabled	User Defined	🗑
□	ACL	specifichostACL	None		50	Disabled	User Defined	🗑

Class Default

Mark: None

Police(kbps): 100

Step 6. Click on **Apply to Device** at the bottom.

CLI equivalent configuration:

```
policy-map BWLimitAAAclients
 class BWLimitAAAclients1_AVC_UI_CLASS
  police cir 8000
   conform-action drop
   exceed-action drop
 class BWLimitAAAclients1_ADV_UI_CLASS
  set dscp af41
 class BWLimitAAAclients2_ADV_UI_CLASS
  police cir 50000
   conform-action transmit
   exceed-action drop
 class class-default
  police cir 100000
   conform-action transmit
   exceed-action drop


class-map match-all BWLimitAAAclients1_AVC_UI_CLASS
  description BWLimitAAAclients1_AVC_UI_CLASS UI_policy_DO_NOT_CHANGE
 match protocol youtube
 match protocol netflix
class-map match-any BWLimitAAAclients1_ADV_UI_CLASS
  description BWLimitAAAclients1_ADV_UI_CLASS UI_policy_DO_NOT_CHANGE
 match dscp ef
class-map match-all BWLimitAAAclients2_ADV_UI_CLASS
  description BWLimitAAAclients2_ADV_UI_CLASS UI_policy_DO_NOT_CHANGE
 match access-group name specifichostACL
```

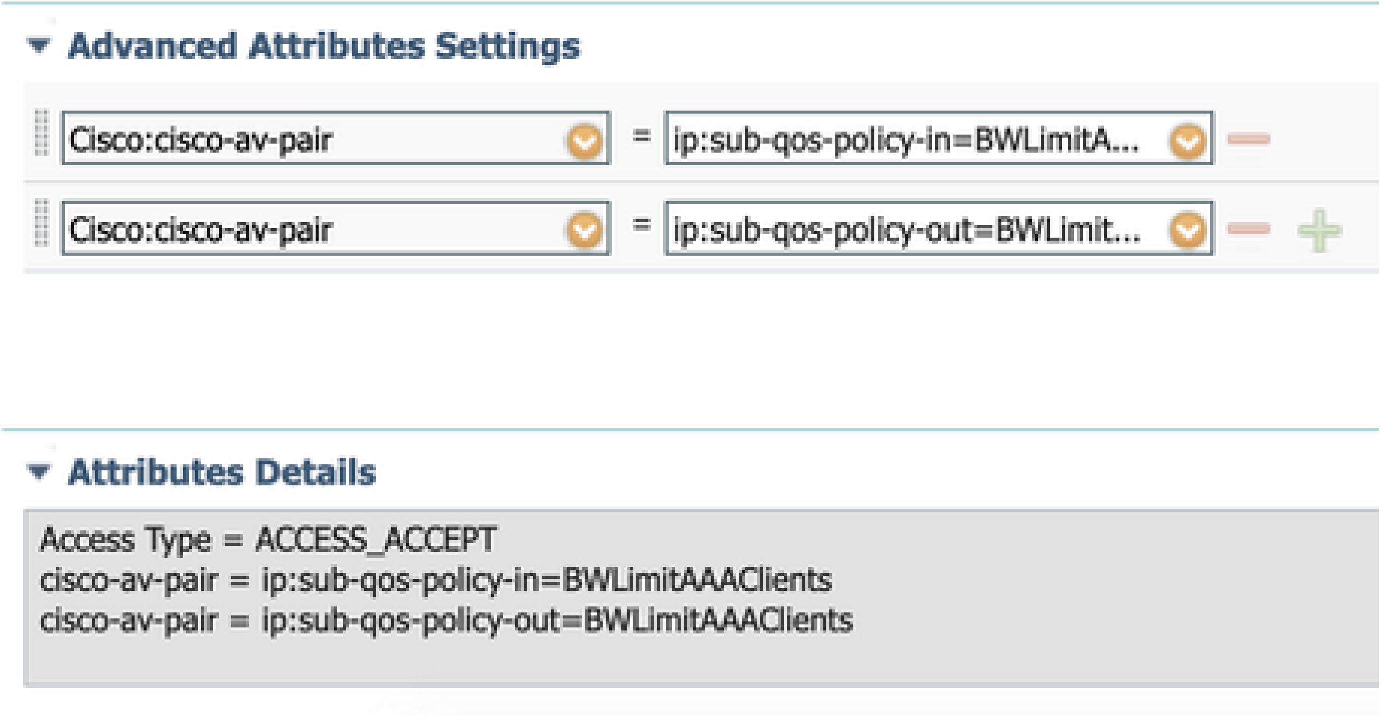
Note: In this example, no **Profiles** were selected under the QoS Policy since it is applied by AAA override. However, in order to apply the QoS policy to a Policy Profile manually, do select the desired Profiles.

Step 2. On ISE, navigate to **Policy** > **Policy Elements** > **Results** > **Authorization Profiles** and select on **+Add** to create an Authorization profile.

To apply the QoS policy, add them as **Advanced Attributes Settings** through Cisco AV Pairs.

It is assumed that ISE Authentication and Authorization policies are configured to match the right rule and get this authorization result.

The attributes are **ip:sub-qos-policy-in=<policy name>** and **ip:sub-qos-policy-out=<policyname>**



Advanced Attributes Settings

Cisco:cisco-av-pair = ip:sub-qos-policy-in=BWLimitA...

Cisco:cisco-av-pair = ip:sub-qos-policy-out=BWLimit...

Attributes Details

Access Type = ACCESS_ACCEPT
cisco-av-pair = ip:sub-qos-policy-in=BWLimitAAAClients
cisco-av-pair = ip:sub-qos-policy-out=BWLimitAAAClients

Note: Policy names are case sensitive. Make sure the case is correct !

Verify

Use this section to confirm that your configuration works properly:

On the WLC

```
# show run wlan
# show run aaa
# show aaa servers
# show ap tag summary
# show ap name <AP-name> tag detail
# show wireless tag policy summary
# show wireless tag policy detailed <policy-tag-name>
# show wireless profile policy detailed <policy-profile-name>
# show policy-map <policy-map name>
# sh policy-map interface wireless ssid/client profile-name <WLAN> radio type <2.4/5GHz> ap name <name>

# show wireless client mac <client-MAC-address> detail
# show wireless client <client-MAC-address> service-policy input
# show wireless client <client-MAC-address> service-policy output

To verify EDCS parameters :
sh controllers dot11Radio 1 | begin EDCA
```

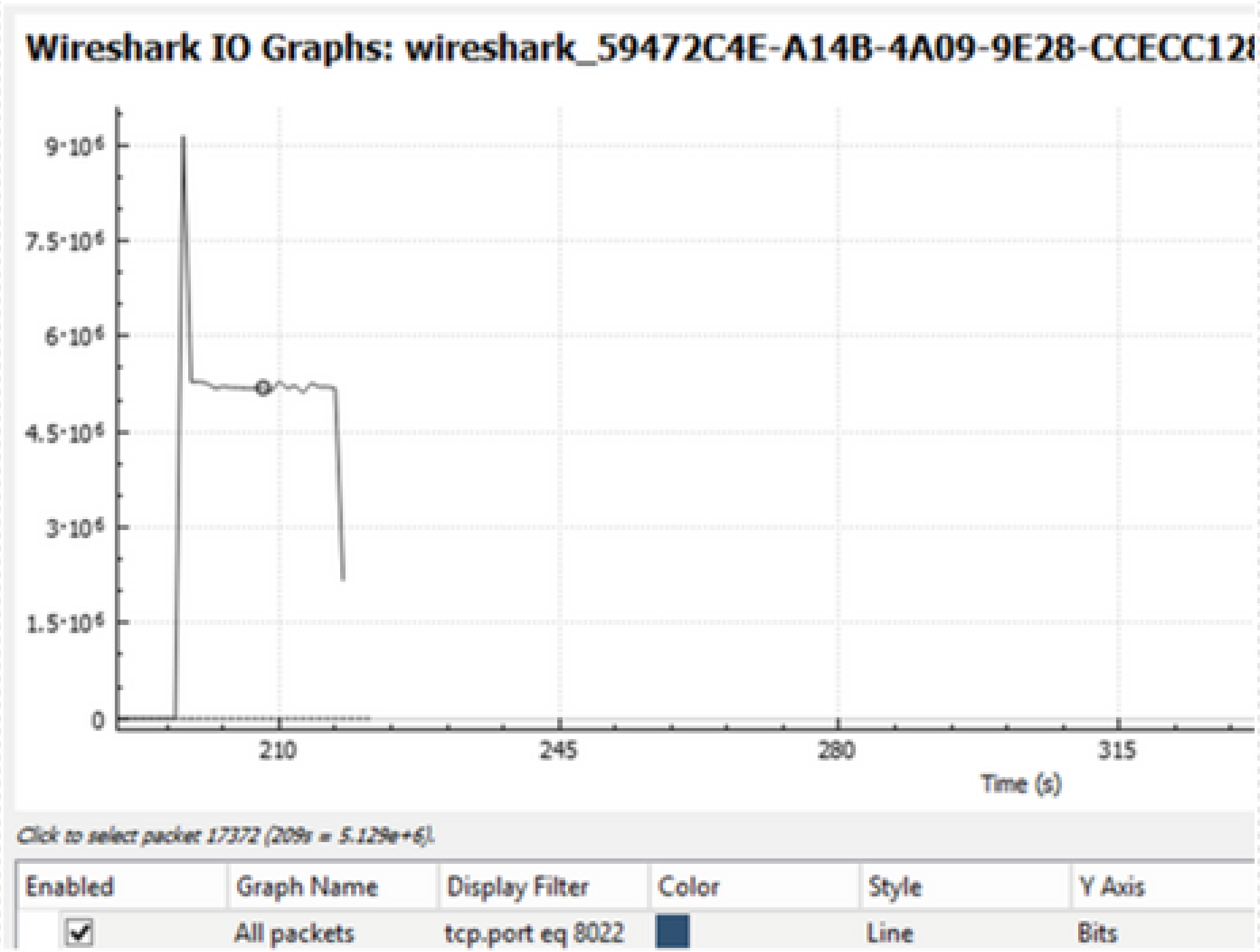
<#root>

```
9800#show wireless client mac e836.171f.a162 det

Client MAC Address : e836.171f.a162
Client IPv4 Address : 192.168.1.11
Client IPv6 Addresses : fe80::c6e:2ca4:56ea:ffbf
                        2a02:a03f:42c2:8400:187c:4faf:c9f8:ac3c
                        2a02:a03f:42c2:8400:824:e15:6924:ed18
                        fd54:9008:227c:0:1853:9a4:77a2:32ae
                        fd54:9008:227c:0:1507:c911:50cd:2062
Client Username : Nico
AP MAC Address : 502f.a836.a3e0
AP Name: AP780C-F085-49E6
AP slot : 1
Client State : Associated

(...)

  Local Policies:
      Service Template : wlan_svc_QoS-PP (priority 254)
          VLAN             : 1
          Absolute-Timer   : 1800
  Server Policies:
          Input QOS        : BWLimitAAAClients
          Output QOS       : BWLimitAAAClients
  Resultant Policies:
          VLAN Name         : default

          Input QOS        : BWLimitAAAClients
          Output QOS       : BWLimitAAAClients

          VLAN             : 1
          Absolute-Timer   : 1800
```

On the AP

No troubleshooting is required on the AP when the AP is in local mode or the SSID in Flexconnect Central Switching mode as the QoS and service policies are done by the WLC.

Packet captures IO Graph analysis


Wireshark IO Graphs: wireshark_59472C4E-A14B-4A09-9E28-CCECC12
9·10⁶
7.5·10⁶
6·10⁶
4.5·10⁶
3·10⁶
1.5·10⁶
0
210
245
280
315
Time (s)

Click to select packet 17372 (209s = 5.129e+6).

Enabled	Graph Name	Display Filter	Color	Style	Y Axis
☑	All packets	tcp.port eq 8022	🟦	Line	Bits

Troubleshoot

This section provides information to troubleshoot your configuration.

Step 1. Clear all pre-existing debug conditions.

```
# clear platform condition all
```

Step 2. Enable the debug for the wireless client in question.

```
# debug wireless mac <client-MAC-address> {monitor-time <seconds>}
```

Step 3. Connect the wireless client to the SSID in order to reproduce the issue.

Step 4. Stop the debugs once the issue is reproduced.

```
# no debug wireless mac <client-MAC-address>
```

The logs captured during the test are stored on the WLC on a local file with the name:

ra_trace_MAC_aaaabbbbcccc_HHMMSS.XXX_timezone_DayWeek_Month_Day_year.log

If GUI workflow is used to generate this trace, the filename saved is debugTrace_aaaa.bbbb.cccc.txt.

Step 5. To collect the file generated previously, either copy the ra trace .log to an external server or display the output directly on the screen.

Check the name of the RA traces file with this command:

```
# dir bootflash: | inc ra_trace
```

Copy the file to an external server:

```
# copy bootflash:ra_trace_MAC_aaaabbbbcccc_HHMMSS.XXX_timezone_DayWeek_Month_Day_year.log tftp://a.b.c.
```

Alternatively display the content:

```
# more bootflash:ra_trace_MAC_aaaabbbbcccc_HHMMSS.XXX_timezone_DayWeek_Month_Day_year.log
```

Step 6. Remove the debug conditions.

```
# clear platform condition all
```

Flexconnect local switching (or fabric/SDA) scenario

In case of flexconnect local switching (or fabric / SDA), it is the AP that applies any QoS policy that you defined on the WLC.

Warning: Due to Cisco bug ID CSCwh74415
, the latest QoS policy returned by the RADIUS server will be applied to all clients connecting to

the same access point and therefore override all other QoS policies. Per-client rate limit with AAA override does not work properly anymore starting 17.6.2 release. Please refer to the bug description to check for the fixed releases.

On wave2 and 11ax Access Points, rate-limit occurs at a per-flow (5 tuple) level and not per-client or per-SSID before 17.6. This applies to AP in Flexconnect/Fabric, Embedded Wireless Controller on Access Point (EWc-AP) deployments.

As of 17.5, AAA override can be leveraged to push the attributes to achieve per-client rate-limit.

As of 17.6, Per Client bi-directional rate limit is supported on 802.11ac Wave 2 and 11ax APs in Flex local switching configuration.

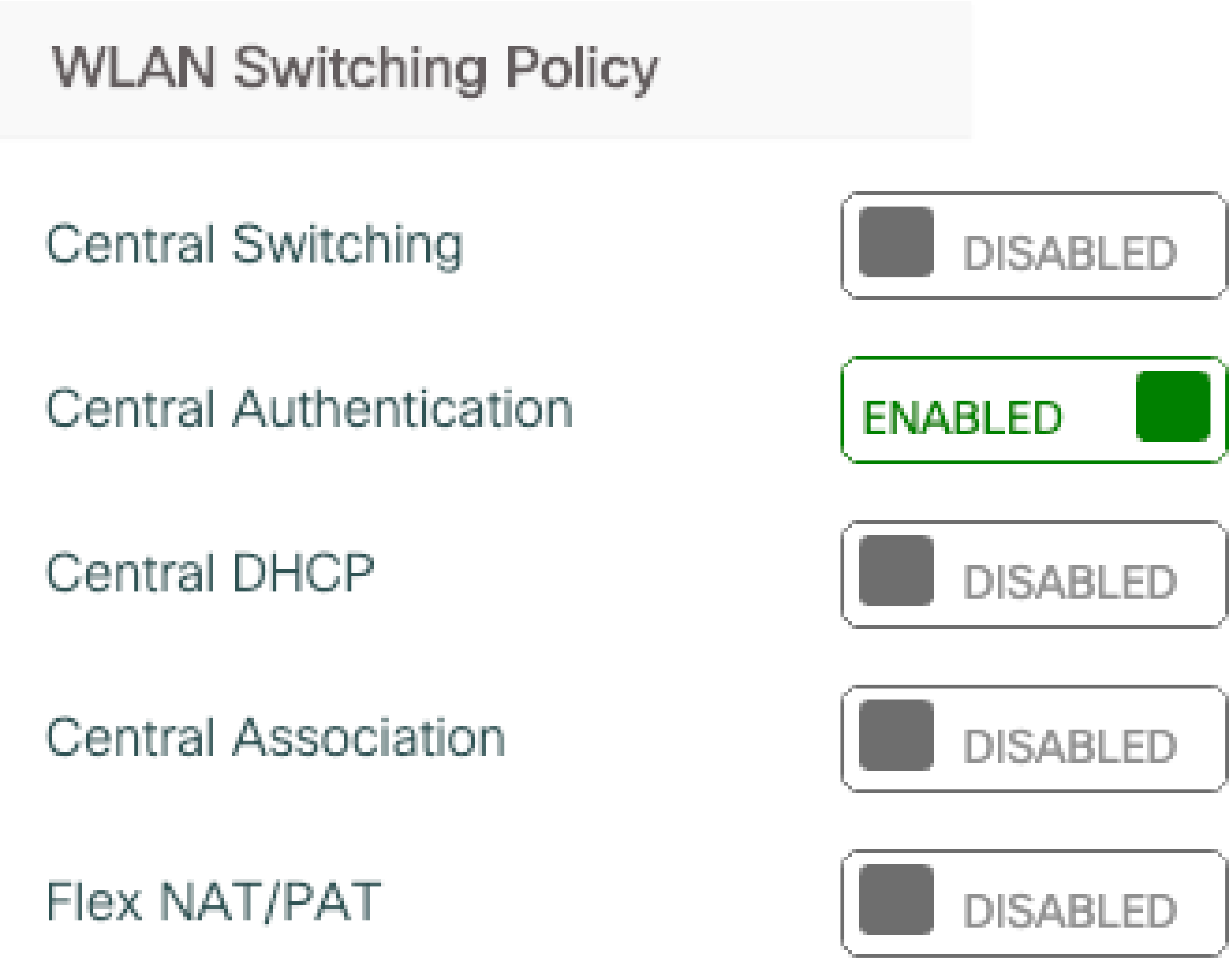
Note: Flex APs do not support the presence of ACLs in QoS policies. They also do not support BRR (bandwidth remain) and policy priority which are configurable through the CLI but not available in the 9800 web UI and not supported on 9800. Cisco bug ID CSCvx81067 tracks the support of ACLs in QoS policies for flex APs.

Configuration

The configuration is exactly the same as the first part of this article with two exceptions :

1. The policy profile is set to local switching. Flex deployment requires Central Association be disabled until Bengaluru 17.4 release.

As of 17.5, this field is not available for user configuration as it is hardcoded.



WLAN Switching Policy

Central Switching DISABLED

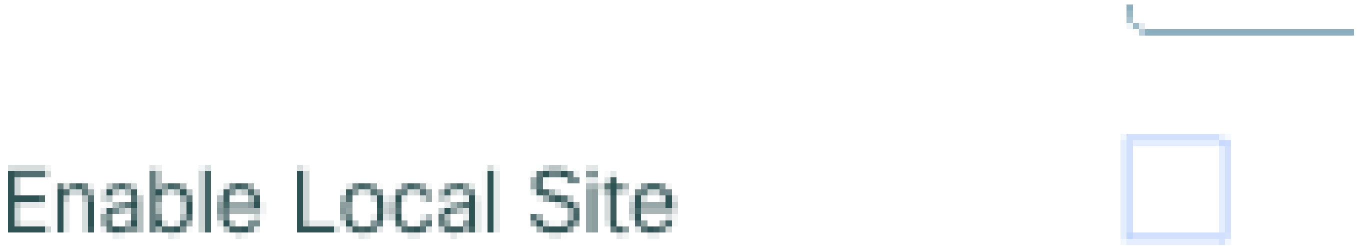
Central Authentication ENABLED

Central DHCP DISABLED

Central Association DISABLED

Flex NAT/PAT DISABLED

2. The site tag is set to not be local site



Enable Local Site □

Troubleshoot Flexconnect/Fabric

Because the AP is the device which applies the QoS policies, these commands can help narrow down what is applied.

show dot11 qos

show policy-map

show rate-limit client

show rate-limit bssid

show rate-limit wlan

show flexconnect client

<#root>

```
AP780C-F085-49E6#

show dot11 qos


Qos Policy Maps (UPSTREAM)

ratelimit targets:
   Client: A8:DB:03:6F:7A:46

platinum-up targets:
   VAP: 0 SSID:LAB-DNAS
   VAP: 1 SSID:VlanAssign
   VAP: 2 SSID:LAB-Qos

Qos Stats (UPSTREAM)

total packets:   29279
dropped packets: 0
marked packets:  0
shaped packets:  0
policed packets: 182
copied packets:  0

DSCP TO DOT1P (UPSTREAM)

Default dscp2dot1p Table Value:
[0]->0 [1]->2 [2]->10 [3]->18 [4]->26 [5]->34 [6]->46 [7]->48
Active dscp2dot1p Table Value:
[0]->0 [1]->2 [2]->10 [3]->18 [4]->26 [5]->34 [6]->46 [7]->48

Trust DSCP Upstream : Disabled

Qos Policy Maps (DOWNSTREAM)

ratelimit targets:
   Client: A8:DB:03:6F:7A:46

Qos Stats (DOWNSTREAM)

total packets:   25673
dropped packets: 0
marked packets:  0
shaped packets:  0
policed packets: 150
copied packets:  0

DSCP TO DOT1P (DOWNSTREAM)
```

```
Default dscp2dot1p Table Value:
[0]->0 [1]->-1 [2]->1 [3]->-1 [4]->1 [5]->-1 [6]->1 [7]->-1
[8]->-1 [9]->-1 [10]->2 [11]->-1 [12]->2 [13]->-1 [14]->2 [15]->-1
[16]->-1 [17]->-1 [18]->3 [19]->-1 [20]->3 [21]->-1 [22]->3 [23]->-1
[24]->-1 [25]->-1 [26]->4 [27]->-1 [28]->-1 [29]->-1 [30]->-1 [31]->-1
[32]->-1 [33]->-1 [34]->5 [35]->-1 [36]->-1 [37]->-1 [38]->-1 [39]->-1
[40]->-1 [41]->-1 [42]->-1 [43]->-1 [44]->-1 [45]->-1 [46]->6 [47]->-1
[48]->7 [49]->-1 [50]->-1 [51]->-1 [52]->-1 [53]->-1 [54]->-1 [55]->-1
[56]->7 [57]->-1 [58]->-1 [59]->-1 [60]->-1 [61]->-1 [62]->-1 [63]->-1
Active dscp2dot1p Table Value:
[0]->0 [1]->0 [2]->1 [3]->0 [4]->1 [5]->0 [6]->1 [7]->0
[8]->1 [9]->1 [10]->2 [11]->1 [12]->2 [13]->1 [14]->2 [15]->1
[16]->2 [17]->2 [18]->3 [19]->2 [20]->3 [21]->2 [22]->3 [23]->2
[24]->3 [25]->3 [26]->4 [27]->3 [28]->3 [29]->3 [30]->3 [31]->3
[32]->4 [33]->4 [34]->5 [35]->4 [36]->4 [37]->4 [38]->4 [39]->4
[40]->5 [41]->5 [42]->5 [43]->5 [44]->5 [45]->5 [46]->6 [47]->5
[48]->7 [49]->6 [50]->6 [51]->6 [52]->6 [53]->6 [54]->6 [55]->6
[56]->7 [57]->7 [58]->7 [59]->7 [60]->7 [61]->7 [62]->7 [63]->7

Profinet packet recieved from
wired port:
0
wireless port:
```

```
AP780C-F085-49E6#
```

show policy-map

```
2 policymaps
Policy Map BWLimitAAAClients            type:qos client:default
    Class BWLimitAAAClients_AVC_UI_CLASS
      drop

    Class BWLimitAAAClients_ADV_UI_CLASS
      set dscp af41 (34)


    Class class-default
      police rate 5000000 bps (625000Bytes/s)
        conform-action
        exceed-action


Policy Map platinum-up          type:qos client:default
    Class cm-dscp-set1-for-up-4
      set dscp af41 (34)


    Class cm-dscp-set2-for-up-4
      set dscp af41 (34)


    Class cm-dscp-for-up-5
      set dscp af41 (34)


    Class cm-dscp-for-up-6
      set dscp ef (46)
    Class cm-dscp-for-up-7
      set dscp ef (46)


    Class class-default
      no actions


AP780C-F085-49E6#
```

show rate-limit client

```
Config:
              mac vap rt_rate_out rt_rate_in rt_burst_out rt_burst_in nrt_rate_out nrt_rate_in nrt_burs
A8:DB:03:6F:7A:46   2           0          0            0           0            0           0
Statistics:
            name    up  down
        Unshaped     0     0
  Client RT pass     0     0
 Client NRT pass     0     0
 Client RT drops     0     0
Client NRT drops     0 38621
               9 54922     0
AP780C-F085-49E6#

AP780C-F085-49E6#
```

show flexconnect client

```
Flexconnect Clients:

              mac radio vap aid state       encr aaa-vlan aaa-acl aaa-ipv6-acl assoc    auth switching
A8:DB:03:6F:7A:46     1   2   1   FWD AES_CCM128     none    none         none Local Central     Local


AP780C-F085-49E6#
```

References

Catalyst 9000 16.12 QoS guide

9800 QoS configuration guide

Catalyst 9800 configuration model

Cisco IOS® XE 17.6 Release Notes