

5760 Series WLC VideoStream Troubleshooting



Document ID: 117719

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Jun 03, 2014

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Introduction

This document describes how to troubleshoot VideoStream issues on the Cisco 5760 Series Wireless LAN Controller (WLC).

Prerequisites

Requirements

Cisco recommends that you have knowledge of these topics:

- Cisco 5760 Series WLC
- VideoStream configuration on the 5760 Series WLC
- Cisco 3602 Series Access Point (AP)

Note: Refer to the Configuring VideoStream GUI section of the *VideoStream Configuration Guide Cisco IOS® XE Release 3SE Cisco 3850 Series Catalyst Switch* for more information about VideoStream configuration.

Components Used

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

- The Cisco 5760 Series WLC that runs software Release 3.3.2
- The Cisco 3602 Series AP that runs in lightweight mode

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, make sure that you understand the potential impact of any command.

Background Information

This section provides an overview of the VideoStream flow through the WLC and the current limitations.

VideoStream Limitations

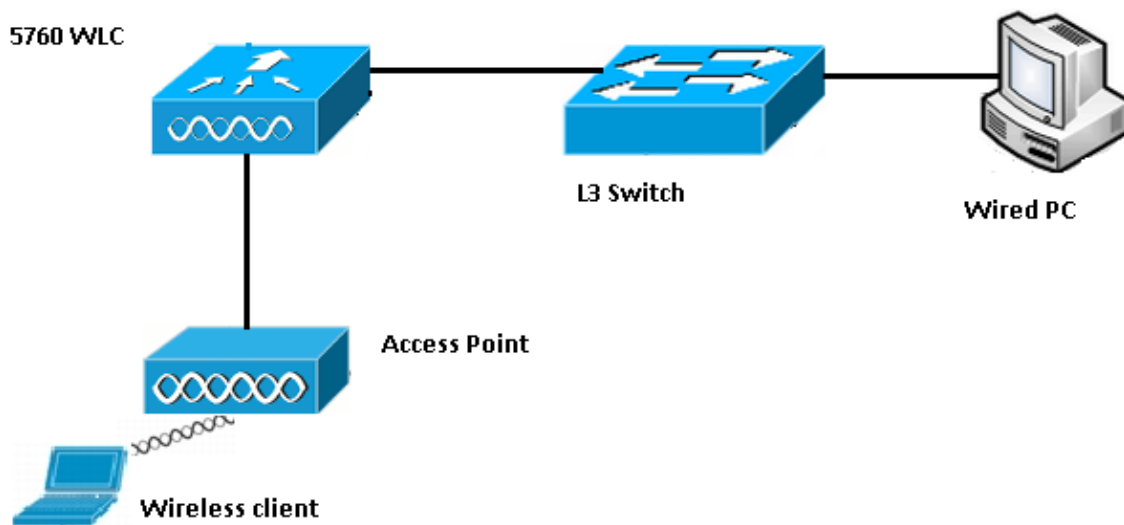
VideoStream enables the wireless architecture to deploy multicast video streaming across the enterprise to wireless clients. The current multicast video delivery mechanism has these limitations:

- Multicast packets are sent at the highest mandatory data rate. This means that even if the client can associate at an 802.11n data rate, the video packets are sent at much lower rates.
- Multicast packets are not acknowledged since there are multiple recipients and it is not scalable to receive acknowledgements from every client.

In order to workaroud these limitations, VideoStream sends the video multicast packets as unicast packets over the air. With this process, the AP can use the individual data rate for each client. This also allows the client to acknowledge any packets that are not received.

VideoStream Flow Through the WLC

Here is a network diagram that illustrates the VideoStream flow through the WLC:



Here are the topology details for this setup:

- The client MAC address is *0017.7c2f.b86e*.
- The multicast video IP address is *239.1.1.1*.
- Multicast with unicast is used as the multicast delivery mechanism to the AP.

These steps describe the VideoStream flow:

1. The client sends an Internet Group Management Protocol (IGMP) join message that the WLC intercepts.
2. The WLC creates a Mapping Group Identification (MGID) entry in order to map the flow with the client request and the associated VLAN.
3. One of the main aspects of VideoStream that makes it different from regular multicast traffic is that the WLC checks with the AP in order to verify that it has the bandwidth required to serve this stream; it sends Radio Resource Control (RRC) messages to the AP.
4. The AP returns its bandwidth and other related statistics in an RRC response. This informs the WLC of the bandwidth that is available on the AP.
5. Based on the response from the AP, the WLC decides to admit the flow and sends the IGMP join message upstream. You can configure the WLC so that it forwards this flow even if there is not enough bandwidth on the AP; however, it marks the flow for the best effort queue. It might also use the default action, which is to not allow the stream and drop the IGMP join message.
6. The WLC tells the AP that the flow is admitted and indicates the amount of bandwidth that must be reserved for this flow.
7. The WLC informs the AP of the WLAN–MGID mapping for the client.
8. The AP then keeps track of the amount of bandwidth that the client uses and the amount of bandwidth that remains for each radio. This information is used when additional streams must be added.
9. When the WLC receives the multicast traffic that is destined to the client, it verifies that the VideoStream is configured and that there is an MGID entry already created.
10. If both of the conditions are satisfied, the WLC forwards the streams to all of the APs that have clients that request this flow. The WLC delivers the multicast streams to the APs with either *Multicast with Unicast* or *Multicast with Multicast*, based on the delivery mechanism that is configured.
11. The AP replaces the destination address with a unicast address and sends the stream via unicast to each client that requests the flow. The packets include an AF41 DSCP mark (802.1p value of 4) and are sent at the data rate that is used for each individual client.

Troubleshoot

Use the information in this section in order to troubleshoot the VideoStream flow through the WLC.

Verify that Multicast Direct is Enabled

In order to verify that multicast direct is enabled on the WLC, enter this command:

```
5760#show wireless media-stream multicast-direct state
Multicast-direct State : Enabled
```

You can also use the *show wireless media-stream group summary* command in order to verify whether a specific multicast address is enabled:

```
5760#show wireless media-stream group summary
```

Number of Groups : 1

Stream Name	Start IP	End IP	Status
<i>video_stream</i>	<i>239.1.1.1</i>	<i>239.1.1.1</i>	<i>Enabled</i>

Note: You must enable multicast-direct globally first, and then for the Wireless LAN (WLAN) as well.

Enable Debugging on the WLC

You can enable debugging on the WLC in order to verify that the RRC is negotiated correctly and that the media stream is allowed. These are the most useful debug commands that you can run:

- ***debug media-stream errors*** – This command provides information in regards to any errors that occur in the media stream process.
- ***debug media-stream event*** – This command provides information about the various state changes that occur.
- ***debug media-stream rrc*** – This command provides information about the RRC messages that are exchanged.
- ***debug call-admission wireless all*** – This command provides information in regards to Command Access Card (CAC) debugs.
- ***debug ip igmp group_address*** – This command provides information about the join process.

Example Debug Command Outputs

The controller initially creates an MGID entry for the client once it sends an IGMP join message:

```
*May 7 22:42:23.632: %IOSXE-7-PLATFORM: 1 process wcm: mscbApMac =  
dca5.f4ec.df30 client_mac_addr = 0017.7c2f.b86e slotId = 0 vapId =  
2 mgid = 4161 numOfSGs = 2, rrc_status = 3  
*May 7 22:42:23.632: %IOSXE-7-PLATFORM: 1 process wcm:  
0017.7c2f.b86e mc2uc update client 0017.7c2f.b86e radio dca5.f4ec.df30  
destIp 239.1.1.1 srcIp 0.0.0.0 mgid 4161 slot 0 vapId 2 vlan 12
```

Once complete, the WLC understands that this particular multicast IP address is configured for media-streaming and begins the RRC process:

```
*May 7 22:42:23.632: %IOSXE-7-PLATFORM: 1 process wcm:  
msPolicyGetRrcQosSupport 1 4 4  
*May 7 22:42:23.632: %IOSXE-7-PLATFORM: 1 process wcm:  
msPolicyPlatform not AP 1100  
*May 7 22:42:23.632: %IOSXE-7-PLATFORM: 1 process wcm:  
0017.7c2f.b86e mc2uc qos admit 1 qos 4 pri 4  
*May 7 22:42:23.632: %IOSXE-7-PLATFORM: 1 process wcm:  
0017.7c2f.b86e mc2uc submit client client  
0017.7c2f.b86e radio dca5.f4ec.df30 destIp  
239.1.1.1 mgid 4161vapId 2 vlan 12  
*May 7 22:42:23.632: %IOSXE-7-PLATFORM: 1 process wcm:  
0017.7c2f.b86e FindRequestByClient not found dest  
239.1.1.1 client 0017.7c2f.b86e radio dca5.f4ec.df30  
source 0.0.0.0 slot 0  
*May 7 22:42:23.632: %IOSXE-7-PLATFORM: 1 process wcm:  
dca5.f4ec.df30 Creating request 3611 for radio  
dca5.f4ec.df30  
*May 7 22:42:23.632: %IOSXE-7-PLATFORM: 1 process wcm:
```

0017.7c2f.b86e *Creating request 3611 for client*
0017.7c2f.b86e

The WLC then sends the RRC request:

```
*May 7 22:42:23.632: %IOSXE-7-PLATFORM: 1 process wcm:  
rrcEngineInsertAdmitRequest dest 239.1.1.1 mgid 4161  
request 3611  
*May 7 22:42:23.632: %IOSXE-7-PLATFORM: 1 process wcm:  
0017.7c2f.b86e rrcEngineSendMeasureMetricsRequest sent  
request 3611 to radio dca5.f4ec.df30,  
minRate = 6000, maxRetryPercent = 80
```

Note: This output shows that the WLC specifies the metrics that are necessary for the flow.

The AP and the WLC now perform various checks before the stream is permitted. This check is performed in order to verify whether the maximum number of streams are reached:

```
*May 7 22:42:23.637: %IOSXE-7-PLATFORM: 1 process wcm:  
rrcEngineFindRequest look for request 3611  
*May 7 22:42:23.637: %IOSXE-7-PLATFORM: 1 process wcm:  
rrcEngineFindRequest found request 3611  
*May 7 22:42:23.638: %IOSXE-7-PLATFORM: 1 process wcm:  
dca5.f4ec.df30 rrcEngineProcessRadioMetrics start  
radio dca5.f4ec.df30 request 3611  
*May 7 22:42:23.638: %IOSXE-7-PLATFORM: 1 process wcm:  
dca5.f4ec.df30 done rrcEngineProcessRadioMetrics  
radio dca5.f4ec.df30 request 3611  
*May 7 22:42:23.643: %IOSXE-7-PLATFORM: 1 process wcm:  
rrcEngineRemoveAdmitRequest request 3611  
*May 7 22:42:23.643: %IOSXE-7-PLATFORM: 1 process wcm:  
p_video = 0, p_voice = 0, pb = 476, video_qo = 0,  
video_l_r_ratio = 0, video_no = 0  
*May 7 22:42:23.643: %IOSXE-7-PLATFORM: 1 process wcm:  
video_delay_hist_severe = 0, video_pkt_loss_discard =  
0, video_pkt_loss_fail = 0  
*May 7 22:42:23.643: %IOSXE-7-PLATFORM: 1 process wcm:  
radio_tx_q_max_size = 1, radio_tx_q_limit = 5684,  
vi_tx_q_max_size = 0, current_rate = 52  
*May 7 22:42:23.643: %IOSXE-7-PLATFORM: 1 process wcm:  
msPolicyGetStreamParameters streamName video_stream  
bandwidth 1000 pakSize 1200  
*May 7 22:42:23.643: %IOSXE-7-PLATFORM: 1 process wcm:  
0017.7c2f.b86e Admit video: number of streams on  
radio is 0, number of streams on client is 0
```

This check is performed in order to verify whether the packet loss for the video queue has crossed the threshold:

```
*May 7 22:42:23.643: %IOSXE-7-PLATFORM: 1 process wcm:  
0017.7c2f.b86e Checking Link Stats for AP  
dca5.f4ec.df30(0) : pkt_loss = 0, video_pps = 0  
*May 7 22:42:23.643: %IOSXE-7-PLATFORM: 1 process wcm:  
0017.7c2f.b86e pkt_discard = 0, num_video_streams = 0  
*May 7 22:42:23.643: %IOSXE-7-PLATFORM: 1 process wcm:  
0017.7c2f.b86e Link Stats Criteria PASSED for AP  
dca5.f4ec.df30(0)
```

This check is performed in order to verify the bandwidth of the AP:

```
*May 7 22:42:23.643: %IOSXE-7-PLATFORM: 1 process wcm:  
0017.7c2f.b86eRequested Video Media Time for AP  
dca5.f4ec.df30(0) : cfg_stream_bw = 1000 kbps
```

```
*May 7 22:42:23.643: %IOSXE-7-PLATFORM: 1 process wcm:
0017.7c2f.b86e current_rate = 26 Mbps, new_stream_pps
= 104 pps, video_pkt_size = 1200 bytes => req_mt
= 3354 MT
*May 7 22:42:23.643: %IOSXE-7-PLATFORM: 1 process wcm:
0017.7c2f.b86e RRC Video BW Check for AP
dca5.f4ec.df30(0) : current chan/voice/video MT =
14875/0/0 MT
*May 7 22:42:23.643: %IOSXE-7-PLATFORM: 1 process wcm:
0017.7c2f.b86e mt remain 16375 readmit_bias 0
current_video_mt 0 media_time_req 3354
video_mt_limit 15625
```

Once all of the criteria are passed, the stream is admitted. The *SNMP admit trap* is sent in order to inform that the media stream is permitted, which is useful in cases where the SNMP is used in order to monitor the streams that are allowed.

```
*May 7 22:42:23.643: %IOSXE-7-PLATFORM: 1 process wcm:
0017.7c2f.b86e Video Stream Admitted: passed all
the checks
*May 7 22:42:23.643: %IOSXE-7-PLATFORM: 1 process wcm:
0017.7c2f.b86e Mapping wme code 1 to history code 0
*May 7 22:42:23.643: %IOSXE-7-PLATFORM: 1 process wcm:
0017.7c2f.b86e Admit video: request 3611 radio
dca5.f4ec.df30, decision 1 admission 2
*May 7 22:42:23.643: %IOSXE-7-PLATFORM: 1 process wcm:
mStreamBandMc2ucAdmit besteffort 1
*May 7 22:42:23.643: %IOSXE-7-PLATFORM: 1 process wcm:
0017.7c2f.b86e Approve Admission on radio
dca5.f4ec.df30 request 3611 vlan 12 destIp
239.1.1.1 decision 1 qos 4 admitBest 1
*May 7 22:42:23.643: %IOSXE-7-PLATFORM: 1 process wcm:
0017.7c2f.b86e RRC Admission: Add history record with
cause code 0 destIp 239.1.1.1
*May 7 22:42:23.643: %IOSXE-7-PLATFORM: 1 process wcm:
0017.7c2f.b86e Sending SNMP admit trap
```

The stream information is now added to the WLC database, and the Quality of Service (QoS) value is set for the video stream:

```
*May 7 22:42:23.643: %IOSXE-7-PLATFORM: 1 process wcm:
bcastRrcHandleClientStatus: group = 239.1.1.1
clientmac = 0017.7c2f.b86eapmac = dca5.f4ec.df30
vlanId = 12 status = 2 qos = 4 mgid = 4161
*May 7 22:42:23.643: %IOSXE-7-PLATFORM: 1 process wcm:
0017.7c2f.b86e RRC clientRecord add clientMac
0017.7c2f.b86e #of streams 1
*May 7 22:42:23.643: %IOSXE-7-PLATFORM: 1 process wcm:
0017.7c2f.b86e RadioInsertStreamRecord # of streams
is 1 on radio dca5.f4ec.df30
*May 7 22:42:23.643: %IOSXE-7-PLATFORM: 1 process wcm:
0017.7c2f.b86e Recording request 3611 destIp
239.1.1.1 qos 4 vlan 12 violation-drop 1 priority 4
sourceIp 0.0.0.0 client 0017.7c2f.b86e radio
dca5.f4ec.df30 slotId 0
*May 7 22:42:23.643: %IOSXE-7-PLATFORM: 1 process wcm:
0017.7c2f.b86e done rrcEngineProcessClientMetrics
client 0017.7c2f.b86e radio dca5.f4ec.df30 request
3611
*May 7 22:42:23.643: %IOSXE-7-PLATFORM: 1 process wcm:
locking mgid Tree in file bcast_process.c line 1988
*May 7 22:42:23.643: %IOSXE-7-PLATFORM: 1 process wcm:
unlocking mgid Tree in file bcast_process.c line 2096
*May 7 22:42:23.643: %IOSXE-7-PLATFORM: 1 process wcm:
```

```
spamLradSendMgidInfo: ap = dca5.f4ec.df30 slotId = 0,
apVapId = 2, numOfMgid = 1 mc2ucflag = 1, qos = 4
```

The WLC forwards the IGMP join message upstream and updates the other components:

```
*May 7 22:42:23.645: (l2mcsn_process_report) Allocating MGID for Vlan:
 12 (S,G): :239.1.1.1
*May 7 22:42:23.645: (l2mcast_wireless_alloc_mcast_mgid) Vlan: 12 Source:
 0.0.0.0 Group: 239.1.1.1
*May 7 22:42:23.645: (l2mcast_wireless_alloc_mcast_mgid) Source: 0.0.0.0
 Group: 239.1.1.1 Vlan: 12 Mgid: 4161
*May 7 22:42:23.645: (l2mcast_wireless_track_and_inform_client) Protocol:
 IGMPSN Client-address: 10.105.132.254 (S,G,V): 0.0.0.0 239.1.1.1 12 Port:
 Ca0, MGID: 4161 Add: Add
*May 7 22:42:25.399: IGMP(0): Set report delay time to 0.2 seconds for
 239.1.1.1 on Vlan12
```

Verify the MGID Entries on the WLC

Enter the *show wireless multicast group summary* command in order to verify the MGID entries that form:

```
5760#show wireless multicast group summary
```

IPv4 groups

```
-----
MGID      Source      Group      Vlan
-----
4160      0.0.0.0      239.1.1.1  12
```

In order to receive more details about the clients that are associated with a specific MGID entry, enter the *show wireless multicast group group_address vlan vlan_id* command:

```
5760#show wireless multicast group 239.1.1.1 vlan 12
```

```
Source : 0.0.0.0
Group  : 239.1.1.1
Vlan   : 12
MGID   : 4160
```

```
Number of Active Clients : 1
Client List -----
```

```
Client MAC Client IP Status
```

```
-----
0017.7c2f.b86e 10.105.132.254 MC2UC_ALLOWED
```

In order to verify the same information on the AP, enter the *show capwap mcast mgid id 4161* command:

```
3602_lw# show capwap mcast mgid id 4161
rx pkts = 6996
tx packets:
wlan : 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
slots0 : 0 6996 0 0 0 0 0 0 0 0 0 0 0 0 0 0
slots1 : 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
slots2 : 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
```

```
Normal Mcast Clients:
```

Reliable Mcast Clients:

```
Client: 0017.7c2f.b86e --- SlotId: 0 WlanId: 1 --- Qos User Priority: 4
State: ADMITTED
History - Retry Pct: 6 5 13 10 Rate (500 Kbps): 116 116 116 116
```

Note: This output shows that the client is added to the *Reliable Mcast Clients* list with a QoS priority of **4**.

Troubleshoot Video Quality on the AP

When video quality issues are reported, you can verify this data on the AP in order to troubleshoot:

- Enter the *show controller dot11radio 0 txq* command in order to view the video transmit queue statistics on the AP:

```
3602_lw#show controller dot11radio 0 txq
(Output clipped)
----- Active ----- In-Progress ----- Counts -----
Cnt      Quo Bas Max Cl Cnt Quo Bas Sent Discard Fail Retry Multi
Uplink   0  64  0  0  0  0  5   0  0  0  0  0
Voice    0 512  0  0  0  60  0 3350  0  2  6  0
Video   0 1024 0  0  0  0 200 50406 0  0  878 2589
Best     0 1024 0  0  0 200  0 126946 0  0 20780 5170
```

It is important to take note of the video queue statistics. You must compare the number of packets that are transmitted with the number of packets that are retried due to failed transmissions.

- Enter the *show controller dot11radio 0 client* command in order to view the parameters for a specific client:

```
3602_lw#show controller dot11radio 0 client

          RxPkts KBytes Dup Dec Mic TxPkts KBytes Retry RSSI SNR
0017.7c2f.b86e 99600 24688 1276 0  0  168590 157253  341 46 46
```

- With the *show controller dot11radio 0* command output, you can also view the video transmission metrics. Take note of the number of successful and failed transmissions and Q-drops that appear in each sampling period:

```
Dot11 Current Video Transmission Metrics:
Arrivals:106 Q-Drops:0 Tries:129 Agg:129 Success:106 Fail:0
```

```
Dot11 5-second Video Transmission Metrics:
Arrivals:147 Tries:195 Agg:195 Success:147 Fail:0
Radio-Q-Peak:9 Video-Q-Peak:32 Video-Q-Drops:0
Delay - Tot Msec:1392 10/20/40/40+ Msec:136/15/12/6
```

```
Dot11 1-second Video Transmission Metrics:
Q-util:71 max-tx-time:22 p-chan:483 p-video:8 L/r:18911
```

Flow Denied by the WLC

This section describes the process that occurs when there is insufficient bandwidth to permit a stream. The WLC verifies the stream requirement against the configured limits and denies the stream:

```
May 8 10:29:36.890: %IOSXE-7-PLATFORM: 1 process wcm: 0017.7c2f.b86e
RRC Video BW Check for AP dca5.f4ec.df30(0) : current
chan/voice/video MT = 16563/0/0 MT
May 8 10:29:36.890: %IOSXE-7-PLATFORM: 1 process wcm: 0017.7c2f.b86e
mt remain 14687 readmit_bias 0 current_video_mt 0 media_time_req
2392 video_mt_limit 1562
May 8 10:29:36.890: %IOSXE-7-PLATFORM: 1 process wcm: 0017.7c2f.b86e
RRC Video BW Check Failed: Insufficient Video BW for AP
dca5.f4ec.df30(0)
```



```
May 8 10:29:36.890: %IOSXE-7-PLATFORM: 1 process wcm: 0017.7c2f.b86e
Video Stream Rejected. Bandwidth constraint.
May 8 10:29:36.890: %IOSXE-7-PLATFORM: 1 process wcm: 0017.7c2f.b86e
Mapping wme code 8 to history code 1
May 8 10:29:36.890: %IOSXE-7-PLATFORM: 1 process wcm: 0017.7c2f.b86e
Deny Admission on radio dca5.f4ec.df30 request 3633 destIp
239.1.1.1 vlan 12
```

Note: For test purposes, the maximum bandwidth allowed for video streaming is changed to 1,000 Kbps in this example.

Similar messages appear when the flow is denied due to any other reason, and the WLC also sends an SNMP trap:

```
May 19 10:29:36.890: %IOSXE-7-PLATFORM: 1 process wcm: 0017.7c2f.b86e
Sending SNMP deny trap
```