Troubleshoot the mDNS Gateway on Wireless LAN Controller (WLC)

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Introduction

This document describes the implementation of the Bonjour protocol on the wireless controller and provides guidelines to help troubleshoot issues.

Prerequisites

Requirements

Cisco recommends that you have knowledge of these topics:

- Basic knowledge of Bonjour Protocol
- Basic knowledge of how to configure mDNS on WLC
- Basic knowledge of Multicast routing

Components Used

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

- AIR-CT2504-K9 WLC, 8.2.141.0
- WS-C3560CX-8PC-S
- AIR-CAP3702I-E-K9
- Apple TV
- Iphone5s, 10.2

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

Bonjour protocol is an Apple service discovery protocol which locates devices and sevices on a local network with the use of multicast Domain Name System (mDNS) service records. The Bonjour protocol operates on service announcements and service queries. Each query or advertisement is sent to the Bonjour multicast address ipv4 <u>224.0.0.251</u> (ipv6 FF02::FB). This protocal uses mDNS on UDP port <u>5353</u>.

The address used by the Bonjour protocol is link-local multicast address and therefore is only forwarded to the local L2 network. Routers cannot use multicast routing to redirect the traffic because the time to live (TTL) is set to 1. This meant that all the service providers/sources (which advertise the service) and Bonjour clients(which ask for service) had to be in the same subnet. This lead to scability problems.

In order to address this issue, the Cisco Wireless LAN Controller (WLC) acts as a Bonjour Gateway. The WLC listens for Bonjour services, caches these Bonjour advertisements (AirPlay, AirPrint, and so on) from the source/host. For example, Apple TV and responds back to Bonjour clients when they ask/request for a service. This way you can have the sources and clients in different subnets.

Configure

Network Diagram



Packet Flow with Debugs

There are basic four steps which take place when mDNS runs on a Cisco WLC. These steps are described as follows:

Step 1. When You Globally Enable mDNS on the WLC

WLC listens to these default services if you does not have a customized mDNS profile created as shown in the image.

Service Name	Service String	Query	LSS Status	Origin	
AirPrint	_ipptcp.local.			ALL	-
AirTunes	_raoptcp.local.	1		ALL	-
AppleTV	_airplaytcp.local.			ALL	r 🔽
HP Photosmart Printer 1	_universalsubipptcp.local.	1		ALL	-
HP Photosmart Printer 2	_cupssubipptcp.local.	4		ALL	-
Printer	_printertcp.local.	1		ALL	-

Each of these services has a service string associated with it. Service strings are used to match service instances to service queries. A service type always contains the service name and the protocol. Additionally, it can contain one or more subtype identifiers. AppleTV service uses: **_airplay._tcp.local**.

When mDNS is enabled globally, the controller sends mDNS queries to 224.0.0.251 for all the services on wired (management and dynamic interfaces) and wireless network.

In this capture at WLC switch port, packets 80, 81 and 82 show WLC sends a query to 224.0.0.251 over the wired network with source IP of the management (10.48.39.142) and dynamic interfaces(192.168.232.11 and 192.168.239.8) as shown in the image.

📕 md	ns									
No.	Time	Source	Destination	Protocol	Length	Signal strength (dBm)	Channel	Info		
F	80 15:24:18.206675	10.48.39.142	224.0.0.251	MDNS	216			Standard query	0x0000	ANY _:
	81 15:24:18.207010	192.168.232.11	224.0.0.251	MDNS	216			Standard query	0x0000	ANY _:
	82 15:24:18.207663	192.168.239.8	224.0.0.251	MDNS	216			Standard query	0x0000	ANY _:
Ľ	83 15:24:18.208051	10.48.39.142	224.0.0.251	MDNS	292			Standard query	0x0000	ANY _:
> F > E > I > U > M	<pre>> Frame 80: 216 bytes on wire (1728 bits), 216 bytes captured (1728 bits) on interface 0 > Ethernet II, Src: Cisco_b9:62:60 (00:a2:89:b9:62:60), Dst: IPv4mcast_fb (01:00:5e:00:00:fb) > Internet Protocol Version 4, Src: 10.48.39.142, Dst: 224.0.0.251 > User Datagram Protocol, Src Port: 5353, Dst Port: 5353 > Multicast Domain Name System (query)</pre>									

Packet 83 shows that WLC sends a query over the wireless. The inner packet shows WLC query to 224.0.0.251 from management interface. Since this query is over the wireless, capwap header is added to the packet with outer source IP still to be that of management but the destination is multicast IP 239.100.100.100 as shown in the image.

L	83 16:24:18.208051 10.48.39.142	224.0.0.251	MDNS	292	Sta	ndard query	0x0000 ANY	_ipptcp.local,	"QU" que
>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>	Frame 83: 292 bytes on wire (2336 bits), 2 Ethernet II, Src: Cisco_b9:62:64 (00:a2:89 Internet Protocol Version 4, Src: 10.48.39 Jser Datagram Protocol, Src Port: 5247, Ds Control And Provisioning of Wireless Acces IEEE 802.11 Data, Flags:F. Logical-Link Control Internet Protocol Version 4, Src: 10.48.39 Jser Datagram Protocol, Src Port: 5353, Ds Multicast Domain Name System (query)	92 bytes captured :b9:62:64), Dst: .142, Dst: 239.10 t Port: 5247 s Points - Data .142, Dst: 224.0. t Port: 5353	(2336 bit IPv4mcast_ 0.100.100	s) on interf 64:64:64 (01	ace 0 :00:5e:64:64:64)				

Now, where does this multicast IP 239.100.100.100 come from? On the WLC, Access Point (AP) multicast

mode (**controller > general**) was set to multicast with multicast group address as 239.100.100.100 (it is just an example, any ip in the 239 range). The APs join this multicast group and listen on it. WLC forwards the query to this group, APs receive it and send it over the air. The address 239.100.100.100 (this is not static, this is what you configured in the next example) only appears in the capwap header between the WLC and the APs, the wireless clients never sees anything of it (but it can see the inner original mdns packet) as shown in the image.

،،ا،،،ا،، cısco	MONITOR WLANS CONTROLLE	WIRELESS SECURITY MANAGEMENT COMMAN	Save Configuration
Controller	General		
General Icons	Name	AKS_WLC	
Inventory Interfaces	LAG Mode on next reboot Broadcast Forwarding	Disabled	urrently disabled).
Interface Groups Multicast	AP Multicast Mode 1 AP IPv6 Multicast Mode 1	Multicast 239.100.100.100 Multicast Group Address Multicast ::	IPv6 Multicast Group Address
 Mobility Management Ports 	AP Fallback CAPWAP Preferred Mode	Enabled V ipv4 V	

Remember in this setup the WLC is a 2504 in vlan 1 and the AP is in vlan 231. As the devices are in different vlans, you needs to have multicast routing enabled for vlan 1 and 239 on the wired for this to work.

Note: If multicast routing is not enabled on the wired for wlc and AP management vlan, then AP multicast mode must be set to unicast. In this mode, the controller unicasts every multicast packet to every AP associated to the controller. This mode is very inefficient and is not recommended.

This capture is the query packet in detail as shown in the image.

mdr	S										
No.	Time	Source	Destination	Protocol	Length	Signal strength (dBm)	Channel	Info			
F	80 15:24:18.206675	10.48.39.142	224.0.0.251	MDNS	216			Standard	query	0x0000	ANY
	81 15:24:18.207010	192.168.232.11	224.0.0.251	MDNS	216			Standard	query	0x0000	ANY
	82 15:24:18.207663	192.168.239.8	224.0.0.251	MDNS	216			Standard	query	0x0000	ANY
	83 15:24:18.208051	10.48.39.142	224.0.0.251	MDNS	292			Standard	query	0x0000	ANY
> Us	er Datagram Protocol,	Src Port: 5247,	Dst Port: 5247								
> Co	ntrol And Provisionin	g of Wireless Ac	cess Points - Da	ata							
> IE	EE 802.11 Data, Flags	:F.									
> Lo	gical-Link Control										
> In	ternet Protocol Versio	on 4, Src: 10.48	.39.142, Dst: 22	4.0.0.251							
> Us	er Datagram Protocol,	Src Port: 5353,	Dst Port: 5353								
✓ Mu	lticast Domain Name S	ystem (query)									
	Transaction ID: 0x000	90									
>	Flags: 0x0400 Standar	rd query									
	Questions: 6	0.0479.043175.2769.049975.0400									
	Answer RRs: 0										
	Authority RRs: 0										
	Additional RRs: 0										
~	Queries										
	> ipp. tcp.local: t	vpe ANY, class	IN, "OU" questio	n							
	> raop. tcp.local:	type ANY, class	IN. "OU" questi	on							
	> airplay. tcp.loca	1: type ANY, cl	ass IN. "OU" que	stion							
	> universal. sub. i	pp. tcp.local:	type ANY, class	IN. "OU" qu	estion						
	> cups. sub. ipp. t	cp.local: type	ANY. class IN. "	OU" questio	n						
	> printer, tcp,loca	1: type ANY, cl	ass IN. "OU" que	stion							

The debugs reflect the same thing as seen in the captures. Here the snippet only shows query from management interface.

```
<#root>
```

(Cisco Controller) >

debug mdns all enable

```
Cisco Controller) >*emWeb: Feb 22 16:24:18.203: bgSetBonjourAccessPolicy :1192 Bonjour AccessPolicy sta
*emWeb: Feb 22 16:24:18.203: bgSetBonjourQueryInterval :1359
Bonjour query interval is already configured for requested value = 15
*Bonjour_Process_Task: Feb 22 16:24:18.215: bonjourProcessTask :
220 Processing message type = BONJOUR_AGGREGATED_QUERY
*Bonjour_Process_Task: Feb 22 16:24:18.215: sendBonjourPkt : 3881 sendBonjourPkt msg-type = BONJOUR_AGG
*Bonjour_Process_Task: Feb 22 16:24:18.216: Send to Wired, All vlan is TRUE
*Bonjour_Process_Task: Feb 22 16:24:18.216: sendBonjourPacketToWired : 3652 sending aggregated query on
*Bonjour_Process_Task: Feb 22 16:24:18.216: buildBonjourPacket : 2916 Preparing for 12 Multicast send
*Bonjour_Process_Task: Feb 22 16:24:18.216: buildBonjourPacket : 2936 allVlan = 0 ,
vlanId = 0
*Bonjour_Process_Task: Feb 22 16:24:18.216: buildBonjourPacket : 2948 simInterfaceMacAddrGet(
management
) = 00:A2:89:B9:62:60
*Bonjour_Process_Task: Feb 22 16:24:18.216: Inside buildBonjourAggregatedQuery, available len = 1458
*Bonjour_Process_Task: Feb 22 16:24:18.216: fillBonjourAggregatedQuery : 7339 Sending mDNS AGGREGATED q
*Bonjour_Process_Task: Feb 22 16:24:18.216: fillBonjourAggregatedQuery : [ 1 ] Including SRV = AirPrint
*Bonjour_Process_Task: Feb 22 16:24:18.216: fillBonjourAggregatedQuery : [ 2 ] Including SRV = AirTunes
*Bonjour_Process_Task: Feb 22 16:24:18.216: fillBonjourAggregatedQuery : [ 3 ] Including SRV = AppleTV :
*Bonjour_Process_Task: Feb 22 16:24:18.216: fillBonjourAggregatedQuery : [ 4 ] Including SRV = HP_Photo
*Bonjour_Process_Task: Feb 22 16:24:18.216: fillBonjourAggregatedQuery : [ 5 ] Including SRV = HP_Photo
*Bonjour_Process_Task: Feb 22 16:24:18.216: fillBonjourAggregatedQuery : [ 6 ] Including SRV = Printer
*Bonjour_Process_Task: Feb 22 16:24:18.216: ------
*Bonjour_Process_Task: Feb 22 16:24:18.216
: fillBonjourAggregatedQuery : PACKET-1 mDNS-QUERY sent for [ 6 ] services
*Bonjour_Process_Task: Feb 22 16:24:18.216: fillBonjourAggregatedQuery : mDNS-QUERY sent for all service
*Bonjour_Process_Task: Feb 22 16:24:18.216: -----
*Bonjour_Process_Task: Feb 22 16:24:18.216: buildBonjourPacket : 3054 BONJOUR_AGGREGATED_QUERY: buildBo
*Bonjour_Process_Task: Feb 22 16:24:18.216: buildBonjourPacket MCAST-DST-IP ADDR = 224.0.0.251
```

Step 2. WLC Caches Bonjour Services (Apple TV Advertisement)

In this packet, the Apple TV (192.168.239.37) sends advertisements to 224.0.0.251. Since in this case Apple TV is wireless, you can see the advertisement sent over capwap. The WLC takes note only once of

the mDNS service response, however, that cache entry has a TTL and keepalives are necessary to maintain it as shown in the image.

I m	dns											
No.	Time	Source	Destination	Protocol	Length	Signal strength (dBm)	Channel	Info				
•	9363 15:22:02.388333	192.168.239.37	224.0.0.251	MDNS	1436			Standard query	response	0x0000	TXT,	cache
	9364 15:22:02.389688	fe80::10c1:887	ff02::fb	MDNS	1456			Standard query	response	0x0000	TXT,	cache
	9369 15:22:02.402261	192.168.239.8	224.0.0.251	MDNS	714			Standard query	response	0x0000	PTR,	cache
	9371 15:22:02.406054	192.168.239.8	224.0.0.251	MDNS	707			Standard query	response	0x0000	PTR,	cache
	10039 15:22:03.390977	192.168.239.37	224.0.0.251	MDNS	1436			Standard query	response	0x0000	TXT,	cache
	10043 15:22:03.391354	fe80::10c1:887	ff02::fb	MDNS	1456			Standard query	response	0x0000	TXT,	cache
	10043 15:22:03.391354 fe80::10c1:887 ff02::fbMDNS1456Standard query response 0x0000 TXT, cache> Frame 9363: 1436 bytes on wire (11488 bits), 1436 bytes captured (11488 bits) on interface 0> Ethernet II, Src: Cisco_5f:f7:ca (00:14:f1:5f:f7:ca), Dst: Cisco_b9:62:60 (00:a2:89:b9:62:60)> Internet Protocol Version 4, Src: 192.168.231.105, Dst: 10.48.39.142> User Datagram Protocol, Src Port: 24505, Dst Port: 5247> Control And Provisioning of Wireless Access Points - Data> IEEE 802.11 Data, Flags:T> Logical-Link Control> Internet Protocol Version 4, Src: 192.168.239.37, Dst: 224.0.0.251> User Datagram Protocol, Src Port: 5353, Dst Port: 5353> Multicast Domain Name System (response)											

The detailed response from Apple TV is as shown in the image.

in mil	15		1											
No.	Time	Source	Destination	Protocol	Length	Signal strength (dBm)	Channel	Info						
	9363 15:22:02.388333	192.168.239.37	224.0.0.251	MDNS	1436			Standard	query	response	0x0000	TXT,	cache	f:
	9364 15:22:02.389688	fe80::10c1:887	ff02::fb	MDNS	1456			Standard	query	response	0x0000	TXT,	cache	f
3	9369 15:22:02.402261	192.168.239.8	224.0.0.251	MDNS	714			Standard	query	response	0x0000	PTR,	cache	f.
	9371 15:22:02.406054	192.168.239.8	224.0.0.251	MDNS	707			Standard	query	response	0x0000	PTR,	cache	f:
	10039 15:22:03.390977	192.168.239.37	224.0.0.251	MDNS	1436			Standard	query	response	0x0000	TXT,	cache	f.
	10043 15:22:03.391354	fe80::10c1:887	ff02::fb	MDNS	1456	2		Standard	query	response	0x0000	TXT,	cache	f]
	[Request In: 9327] [Time: 0.040960000 se Transaction ID: 0x000 Flags: 0x8400 Standar Questions: 0 Answer RRs: 21 Authority RRs: 0 Additional RRs: 8 Answers > 70-35-60-63.1 Wire > servicesdns-sd. > 70-35-60-63.1 Wire > Wireless Team (4). > servicesdns-sd. > answers	conds] /0 'd query response less Team (4)s _udp.local: type local: type PTR, less Team (4)s _airplaytcp.lc _udp.local: type }	e, No error PTR, class IN, class IN, 70-35 leep-proxyudp. cal: type TXT, c PTR, class IN,	local: typ _sleep-pro -60-63.1 W local: typ :lass IN, c _airplay Toam (4)	e TXT, xyudp ireless e SRV, ache fl tcp.loc	class IN, cache b.local : Team (4)sleep class IN, cache Lush :al	flush p-proxy flush, p	udp.local	, weig	ht 0, por	t 53104	, tarı	get Wir	el

- > 18EE6911DC61@Wireless Team._raop._tcp.local: type TXT, class IN, cache flush

These debugs show Apple TV in respond to the WLC's queries . In this scenario, Apple TV responded with 21 services out of which only Airplay service is of interest.

<#root>

*Bonjour_Msg_Task: Feb 23 16:22:02.372:

18:ee:69:11:dc:60

Parsing 21 Bonjour Answers.

```
*Bonjour_Msg_Task: Feb 23 16:22:02.374: bgProcessServiceAdvRsp : 1562 aStringNameStr = Wireless Team (4
*Bonjour_Msg_Task: Feb 23 16:22:02.374: bgProcessServiceAdvRsp : 1579 RR: Wireless Team (4)._airplay._t
*Bonjour_Msg_Task: Feb 23 16:22:02.374: bgProcessServiceAdvRsp : 1581 aStringNameStr : Wireless Team (4
```

Bonjour_Msg_Task: Feb 23 16:22:02.374: Found Service Name:_airplay._tcp.local., Service Provider Name:W

```
*Bonjour_Msg_Task: Feb 23 16:22:02.374: bgServiceAllowedInMsalDb : 181 srv_str = _airplay._tcp.local. t
*Bonjour_Msg_Task: Feb 23 16:22:02.374: bgServiceAllowedInMsalDb : 195 Incoming Service Advertisement s
*Bonjour_Msg_Task: Feb 23 16:22:02.374: Service-Name = AppleTV Service-String = _airplay._tcp.local. Typ
<<< Airplay service registered in WLC DB >>
*Bonjour_Msg_Task: Feb 23 16:22:02.374: Service Name:_airplay._tcp.local. is supported in Master-servic
*Bonjour_Msg_Task: Feb 23 16:22:02.374: aDataLen: 2, aSrPtrRecord.aSrvProName.size: 39
*Bonjour_Msg_Task: Feb 23 16:22:02.374: Updating updateBonjourSrPtrDb:
*Bonjour_Msg_Task: Feb 23 16:22:02.374: aType: 12, aClass: 1, aTTL: 4500, aDataLen: 2, ptr: 0x327a9d93,
*Bonjour_Msg_Task: Feb 23 16:22:02.374:
                                                 bgProcessServiceAdvRsp : .. < SP-SR_PTR PKT >...
                                                 bgProcessServiceAdvRsp : SERVICE NAME ..... = Appl
*Bonjour_Msg_Task: Feb 23 16:22:02.374:
*Bonjour_Msg_Task: Feb 23 16:22:02.374:
                                                 bgProcessServiceAdvRsp : SERVICE STRING ..... = _ain
*Bonjour_Msg_Task: Feb 23 16:22:02.374:
                                                 bgProcessServiceAdvRsp : SERVICE PROVIDER ..... = Wire
                                                 bgProcessServiceAdvRsp : aTTL ..... = 450
*Bonjour_Msg_Task: Feb 23 16:22:02.374:
```

*Bonjour_Msg_Task: Feb 23 16:22:02.374: bgProcessServiceAdvRsp : 1546 msg : 0x327a9bda, ptr : 0x327a9d9

Step 3. WLC Listens to Client Queries For Services

Later on, at any point in time, the wireless client (192.168.232.98) sends a query which asks for airplay service over the air (typically when the client opens up an application that is airplay capable) as shown in the image.



<#root>

*Bonjour_Msg_Task: Feb 27 17:03:15.603: 00:6d:52:5d:5a:7d Parsing 2 bonjour questions

*Bonjour_Msg_Task: Feb 27 17:03:15.603: 00:6d:52:5d:5a:7d Query Service Name: _airplay._tcp.local., RR-

*Bonjour_Msg_Task: Feb 27 17:03:15.603: processBonjourPacket : 1017 qNameStr : _airplay._tcp.local., bor

*Bonjour_Msg_Task: Feb 27 17:03:15.603: Service Name : AppleTV Service String : _airplay._tcp.local. i *Bonjour_Msg_Task: Feb 27 17:03:15.603: 00:6d:52:5d:5a:7d SRV : _airplay._tcp.local. is supported by cl

Step 4. WLC Sends Unicast Response to Client Queries for Bonjour Services

The WLC responds with cached service Wireless Team (4)._airplay._tcp.local. The source IP of the inner packet is the dynamic interface of the client vlan, in this case 192.168.232.11 as shown in the image.

II m	dns													
No.	Time	Source	Destination	Protocol	Length	Signal strength (dBm)	Channel	Info						
F	8885 16:06:45.782278	192.168.232.11	224.0.0.251	MDNS	775			Standard	query	response	0x0000	PTR,	cache	flush 1
	8886 16:06:45.783030	192.168.232.11	224.0.0.251	MDNS	782			Standard	query	response	0x0000	PTR,	cache	flush W
	8887 16:06:45.783869	192.168.232.11	224.0.0.251	MDNS	775			Standard	query	response	0x0000	PTR,	cache	flush 1
L	8888 16:06:45.784786	192.168.232.11	224.0.0.251	MDNS	782			Standard	query	response	0x0000	PTR,	cache	flush W
	8965 16:06:46.120078	192.168.239.40	224.0.0.251	MDNS	196			Standard	query	response	0x0000	TXT		
	8966 16:06:46.121534	fe80::10c1:887	. ff02::fb	MDNS	216			Standard	query	response	0x0000	TXT		
>	Frame 8886: 782 bytes or	wire (6256 bit	s), 782 bytes car	otured (62	6 bits)	on interface 0								
> 1	Ethernet II. Src: Cisco	b9:62:64 (00:a2	:89:b9:62:64), D	st: Cisco	f:f7:ca	(00:14:f1:5f:f)	7:ca)							
> :	Internet Protocol Versio	on 4, Src: 10.48	.39.142, Dst: 19	2.168.231.1	105									
> 1	Jser Datagram Protocol,	Src Port: 5247,	Dst Port: 24505											
> 1	Control And Provisioning	g of Wireless Ac	cess Points - Dat	ta										
> :	IEEE 802.11 Data, Flags:	F.												
> 1	Logical-Link Control													
> :	Internet Protocol Versio	on 4, Src: 192.1	68.232.11, Dst: 2	224.0.0.25	L									
> 1	Jser Datagram Protocol,	Src Port: 5353,	Dst Port: 5353											
~ 1	Multicast Domain Name Sy	<pre>/stem (response)</pre>												
	Transaction ID: 0x000	0												
	> Flags: 0x8400 Standar	d query response	e, No error											
	Questions: 0													
	Answer RRs: 7													
	Authority RRs: 0													
	Additional RRs: 0													
	✓ Answers													
	> _airplaytcp.loca	1: type PTR, cla	ass IN, cache flu	sh, Wirele	ss Team	(4)airplayt	cp.local							
	> services. dns-sd.	udp.local: type	e PTR, class IN,	airplay.	tcp.loc	əl								
a														
Sr	uppet from debug	2												
		-												
/+	mont>													
< +	1001>													

BONJOUR_AGGREGATED_QUERY_RESPONSE

*Bonjour_Process_Task: Feb 27 17:03:45.229: buildBonjourQueryResponsePld : SRV-NAME : AppleTV
*Bonjour_Process_Task: Feb 27 17:03:45.229: buildBonjourQueryResponsePld : SEND TO : BONJOUR_PKT_
*Bonjour_Process_Task: Feb 27 17:03:45.229: buildBonjourQueryResponsePld : VLAN : 232
*Bonjour_Process_Task: Feb 27 17:03:45.229: buildBonjourQueryResponsePld : IS MCAST : NO
*Bonjour_Process_Task: Feb 27 17:03:45.230: buildBonjourQueryResponsePld : DST-MAC : 00:6D:52:51

*Bonjour_Process_Task: Feb 27 17:03:45.230: buildBonjourQueryResponsePld : DST-IP : 192.168.232

```
*Bonjour_Process_Task: Feb 27 17:03:45.230: buildBonjourQueryResponsePld : ALL mDNS-AP .. : 0
*Bonjour_Process_Task: Feb 27 17:03:45.230: buildBonjourQueryResponsePld : TTL COUNTER .. : TIMEOUT_RES
*Bonjour_Process_Task: Feb 27 17:03:45.230: buildBonjourQueryResponsePld : RESTART TIME . : 0
*Bonjour_Process_Task: Feb 27 17:03:45.230: buildBonjourQueryResponsePld : SNOOP STATUS . : 0
*Bonjour_Process_Task: Feb 27 17:03:45.230: buildBonjourQueryResponsePld : LSS STATUS ... : DISABLED
*Bonjour_Process_Task: Feb 27 17:03:45.230: buildBonjourQueryResponsePld : RSP SRV NAME . : AppleTV
*Bonjour_Process_Task: Feb 27 17:03:45.230: buildBonjourQueryResponsePld : MSG-ID ...... : 0
*Bonjour_Process_Task: Feb 27 17:03:45.230: buildBonjourQueryResponsePld : POLICY STATUS : DISABLED
*Bonjour_Process_Task: Feb 27 17:03:45.230: buildBonjourQueryResponsePld INCLUDING SpData : Wireless Tea
*Bonjour_Process_Task: Feb 27 17:03:45.233: VALID SR-PTR RR FOUND, attaching.....
*Bonjour_Process_Task: Feb 27 17:03:45.233: VALID SD-PTR RR FOUND, attaching.....
*Bonjour_Process_Task: Feb 27 17:03:45.233: VALID SRV RR FOUND, attaching.....
*Bonjour_Process_Task: Feb 27 17:03:45.233: VALID TXT RR FOUND, attaching.....
*Bonjour_Process_Task: Feb 27 17:03:45.233: VALID NSEC RR FOUND, attaching.....
*Bonjour_Process_Task: Feb 27 17:03:45.233: VALID DOMAIN RR FOUND, attaching.....
*Bonjour_Process_Task: Feb 27 17:03:45.233: fillBonjourDomain : 6055 : attaching SP-DOMAIN RR
*Bonjour_Process_Task: Feb 27 17:03:45.233: VALID DOMAIN-NSEC RR FOUND, attaching.....
*Bonjour_Process_Task: Feb 27 17:03:45.233: buildBonjourPacket DST-IP ADDR = 192.168.232.98
*Bonjour_Process_Task: Feb 27 17:03:45.233: Transmitting bonjour Pkt to STA: 00:6D:52:5D:5A:7D
```

*Bonjour_Process_Task: Feb 27 17:03:45.233: Unicast Packet sent to client 00:6D:52:5D:5A:7D success.

Verification and Troubleshooting

This section provides information you can use in order to confirm and troubleshoot your configuration.

In order to identify and isolate issues in mdns requires the configuration to be correct and thus requires few basic checks.

Step 1. mDNS must be enabled globally.

From GUI navigate **Controller > mDNS** as shown in the image.

cisco	MONITOR	<u>W</u> LANs	<u>C</u> ONTROLLER	WIRELESS	SECURITY	M <u>A</u> NAGEMENT	C <u>O</u> MMAN
Controller			6 S				
General	Global Co	nfiguratio	n				
Icons	mDNS Glo	obal Snoop	ing				
Inventory	mDNS Po	licy 1					
Interfaces Interface Groups	Query Int	erval (10-1	120)			15 (mins)	

From CLI:

<#root>

show network summary

(snippet)

mDNS snooping..... Enabled mDNS Query Interval..... 15 minutes

Step 2. If you use a custom mDNS profile ensure that all the required services are added to it.

Step 3. Ensure that mDNS is enabled under the SSID and the correct mdns profile is mapped to the SSID.

From GUI navigate to **WLAN > WLAN ID > Advanced** as shown in the image.

Enabled

Step 4. Verify whether mDNS service provider is listed in the mDNS domains services. This lists the domain names (Apple TV, airprinters) of the services that have been cached by the WLC.

From GUI, navigate to **Controller > mDNS > mDNS Domain Name IP> Summary** as shown in the image.

mDNS Domain Name IP > Summa	гу										
Number of Domain Name-IP Entries 1											
Domain Name	MAC Address	IP Address		Vlan Id	Туре		п	L (seconds))	Time Left (seco	nds)
Wireless-Team-3.local.	18:ee:69:11:dc:60	192.168.239.37		239	Wireless		47	25		4492	
1. Maximum of 500 entries will be displaye	d.										
From CLI:											
<#root>											
show mdns domain-	name-ip summa	ary									
Number of Domain	Name-IP Entr	ies		1							
DomainName	MAC Ad	dress 	IP Addres	S \	/lan Id 	Туре 	TTL	Time	left 	(sec)	(sec)
Wireless-Team-3.1	ocal. 18:ee:	69:11:dc:60	192.168.2	39.37 2	239	Wireless	4725	5 41	L63		

Step 5. Verify whether the service provider is also listed under the specific service itself.

From GUI, navigate to **Controller > mDNS > General > Service Name** as shown in the image.

mDNS Service > Detail					< Back	Apply
Service Name		AppleTV				
Service String		_airplaytcp.local.				
Service Id		3				
Service Query Status		2				
LSS Status						
Origin		ALL				
Profile Count		1				
Service Provider Count		1				
Profile Information		Service Provider Information				
Profile Name		MAC Address	Service Provider Name	AP Radio MAC	Vlan Id	Туре
default-mdns-profile		18:ee:69:11:dc:60	Wireless Team (4)airplaytcp.local.	a4:6c:2a:7c:8f:80	239	Wireless
Priority MAC Information Priority MAC AP Group	default-group V	Ī				
Priority MAC AP Group	Add					

From CLI:

<#root>

show mdns service detailed AppleTV

AppleTV
_airplaytcp.local.
3
Enabled
Disabled
Wireless and Wired
1
default-mdns-profile
1
0
Type TTL Time left(sec) (sec)

Wireless Team (4)._airplay._tcp.local. 18:EE:69:11:DC:60 A4:6C:2A:7C:8F:80 239 Wireless 4500 3841

Step 6. If the service is not discovered by the WLC, then check if it is to be learnt under bonjour browser (Controller>>mDNS>>mDNS browser). Bonjour browser is a cache of all the service advertisements seen at the WLC and not discovered because configuration did not allow to learn. You can select and add services from the Bonjour browser, this comes in handy when you test and implement a new service.

Step 7. These are the commands to debug Bonjour:

<#root>

debug mdns error enable debug mdns message enable debug mdns detail enable debug mdns all enable

Bonjour browser and show mdns service not-learnt could be used as a debug tool as well.

Step 8. As mentioned before, If WLC and AP are in different subnets and AP multicast mode is set to multicast, then ensure that multicast routing is enabled on the wired network between the two vlans. In this setup, vlans are vlan 1 (WLC) and vlan 231 (AP).

```
Conf t
1
interface Vlan1
ip pim sparse-dense-mode
interface Vlan231
ip pim sparse-dense-mode
L
Multicast routing at play:
<#root>
Gateway#sh ip mroute 239.100.100.100
IP Multicast Routing Table
-----snippet-----
(*, 239.100.100.100), 2w4d/stopped, RP 10.48.39.5, flags: SJC
 Incoming interface: Null, RPF nbr 0.0.0.0
 Outgoing interface list:
   Vlan231, Forward/Sparse-Dense, 2w0d/00:02:10
   Vlan232, Forward/Sparse-Dense, 2w4d/00:02:11
(
10.48.39.142
, 239.100.100.100), 2w4d/00:02:50, flags: T
Incoming interface: Vlan1
, RPF nbr 0.0.0.0, RPF-MFD
```

Outgoing interface list:

```
Vlan231, Forward/Sparse-Dense, 2w0d/00:02:10, H
```

Along with these checklist, the key is to understand the packet flow when mDNS runs on WLC. The packet flow and the debugs help deep dive into areas where the previous

verification commands fall short.