Configure mDNS on Catalyst 9800 Wireless Controller

Contents

Introduction

This document describes how to configure and verify/troubleshoot the multicast Domain Name Services (mDNS) Gateway feature on Catalyst 9800 Wireless Controllers. It also explains how this special multicast traffic known as mDNS (or Bonjour) is handled by C9800 controllers.

Prerequisites

Requirements

Cisco recommends that you have knowledge of these topics:

- mDNS Bonjour Protocol
- Catalyst 9800 Wireless Controller

Components Used

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

- C9800-CL-K9 version 16.12.1s
- WS-C3560CX-12PC-S
- C9117AXI-A
- Chromecast NC2-6A5-D

- MacbookPro 10.14.5

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

mDNS Bridging

In C9800 Architecture, mDNS (Bonjour Protocol) Bridging refers to same L2 broadcast domain Bonjour TTL=1 protocol packet forwarding. The dataplane enables mDNS bridging functionality for packets received on the wired ports and wireless interfaces for each WLAN by default. This is the default behavior without specific configuration required, as not even Global mDNS needs to be enabled to allow mDNS Bridging to work, however, you can disable it per WLAN if needed by just changing the mDNS mode at WLAN settings. If Access Point (AP) Control and Provisioning of Wireless Access Points (CAPWAP) Multicast-Multicast mode is enabled, C9800 bridges each mDNS packet to the AP multicast group configured on the controller so wireless clients can receive it, otherwise, it will create a copy of each mDNS packet received, which is then bridged individually to every single AP via CAPWAP unicast tunnel. Both scenarios, C9800 also bridges the mDNS packets into the wired at the VLAN of the client that originated the mDNS packet.

Therefore, mDNS will work in C9800 without special configuration as long as the devices involved in mDNS handshake (like client and Chromecast for example) are on the same subnet. Ideally, it is better to filter mDNS traffic with the use of mDNS Gateway as explained in the next section.

mDNS Gateway

The mDNS Gateway feature introduced on AireOS Wireless Controllers is also supported on Catalyst 9800 Wireless Controllers from 16.11.1. This feature is disabled by default and you can enable/disable it per WLAN after you enable it globally.

The mDNS Gateway feature works the same way like in previous AireOS Wireless Controller, the C9800 listens for Bonjour services (mDNS advertisements and queries) on wired and wireless interfaces, caches these Bonjour services (AirPlay, AirPrint, Googlecast, etc.) advertised from each source/host in an internal database and is able to bridge those mDNS packets between different broadcast domains while filtering unneeded services and avoiding their multicast flow in the network. This way you can have the sources and clients of such services in different subnets, and also control mDNS traffic in your network.

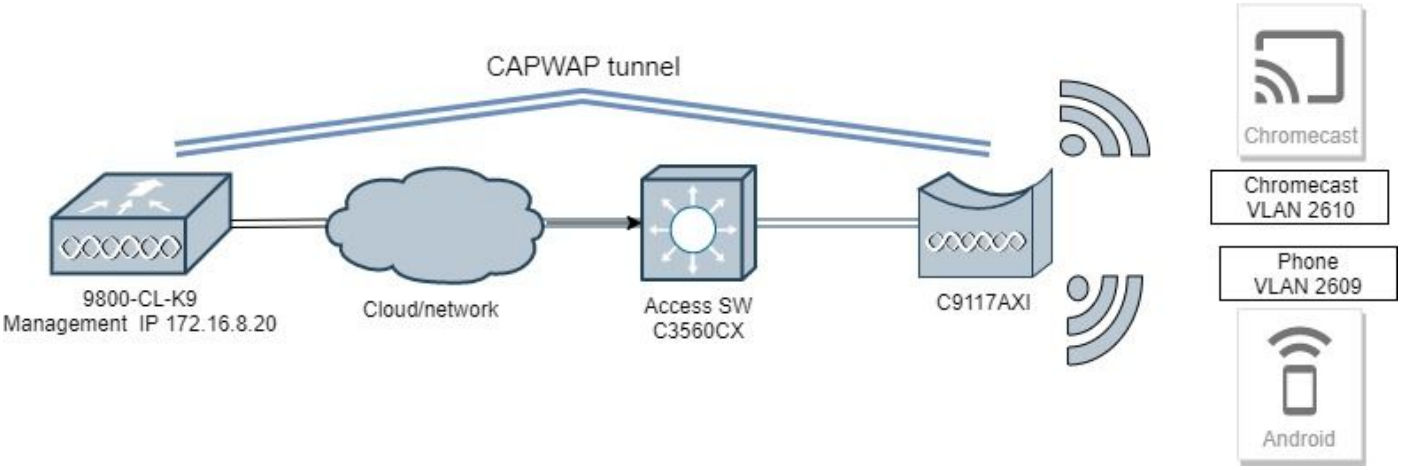
The C9800 that acts as mDNS Gateway replies to mDNS queries from clients (for cached services) sourcing these mDNS responses with the use of its IP address for the VLAN assigned to the client asking for the service. This is why all VLANs on the C9800 controller where there are clients that require mDNS/Bonjour services must have a valid IP address configured at the Switched Virtual Interface (SVI).

For more information about the Bonjour/mDNS Gateway feature, refer to AireOS Wireless LAN Controller Bonjour Phase III Deployment Guide.

Configure

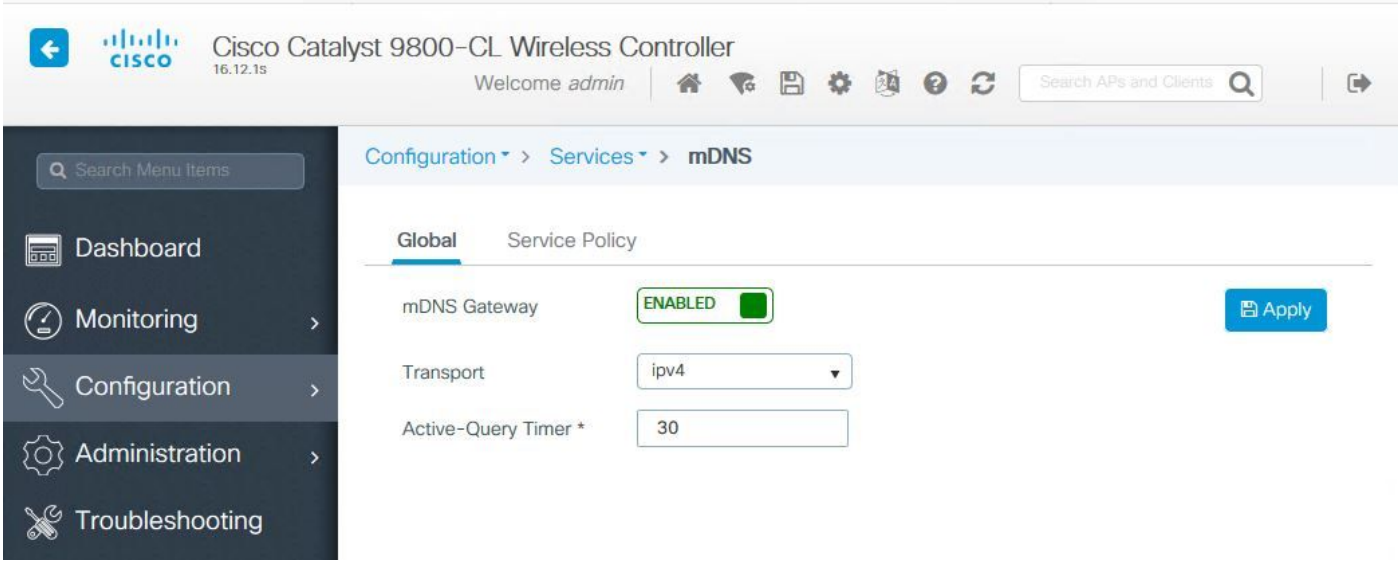
Network Diagram

This is the diagram of the example setup. The purpose is to allow wireless clients to use mDNS services from a different subnet, which requires mDNS Gateway as shown in the image.



Configure mDNS Gateway via Graphical User Interface

Step 1. In order to enable mDNS Gateway globally, navigate to **Configuration > Services > mDNS**. Under Global, switch to **Enable mDNS Gateway** and select **Apply** as shown in the image.



Step 2 (Optional). Configure a custom mDNS Service List for a custom Service Policy. If you want to use default mDNS Service List and Service Policy, move to Step 5.

Under **Configuration > Services > mDNS**, in the **Service Policy** tab, configure new Service Lists as required. C9800 has predefined common services used by most wireless devices. If you don't need a special (not available) service, you can create a List with predefined available Services, but if needed, you can also add new services (with Service Definition).

You need both, a Service List for Incoming (IN) direction and a Service List for Outgoing (OUT) direction (so required services are filtered when coming into the C9800 and when going out from it; hence, both lists are supposed to have the same services).

1. Define a Service List Name for IN services.

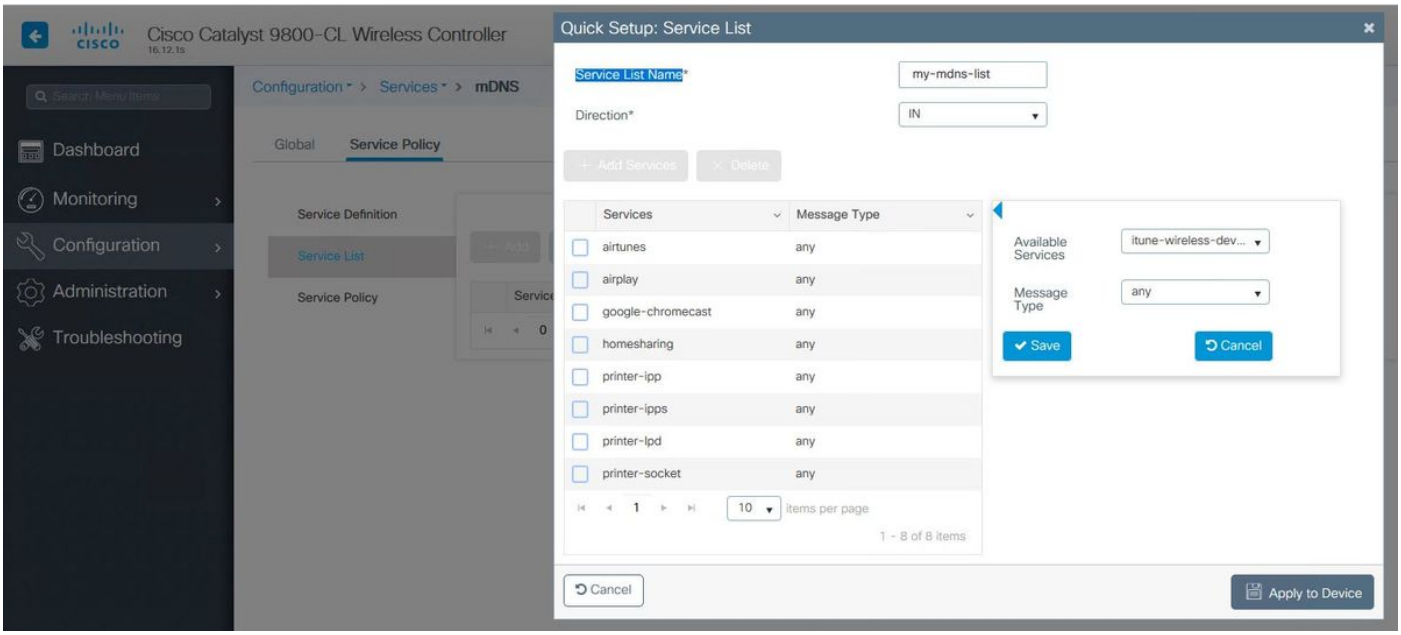
2. Select **IN** direction.

3. Select **Add Services**.

4. **Available Services** drop-down list is displayed, select the desired Service and Message Type **any**.

5. Repeat steps to add more services as required.

6. Select **Apply to Device** as shown in the image.



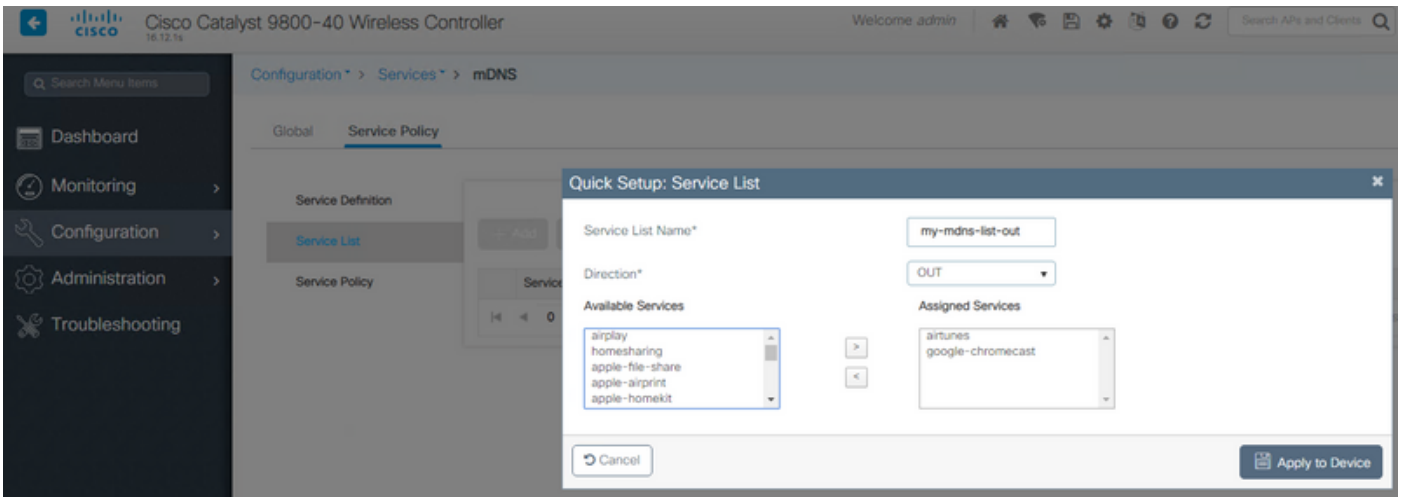
1. Define a Service List Name for OUT services.

2. Select **OUT** direction.

3. Move **Available Services** into the **Assigned Services** list.

5. Repeat steps to add more services as required.

6. Select **Apply to Device** as shown in the image.



Tip: Upon migration task from previous AireOS WLC, you can build your new list based on AireOS default mDNS list.

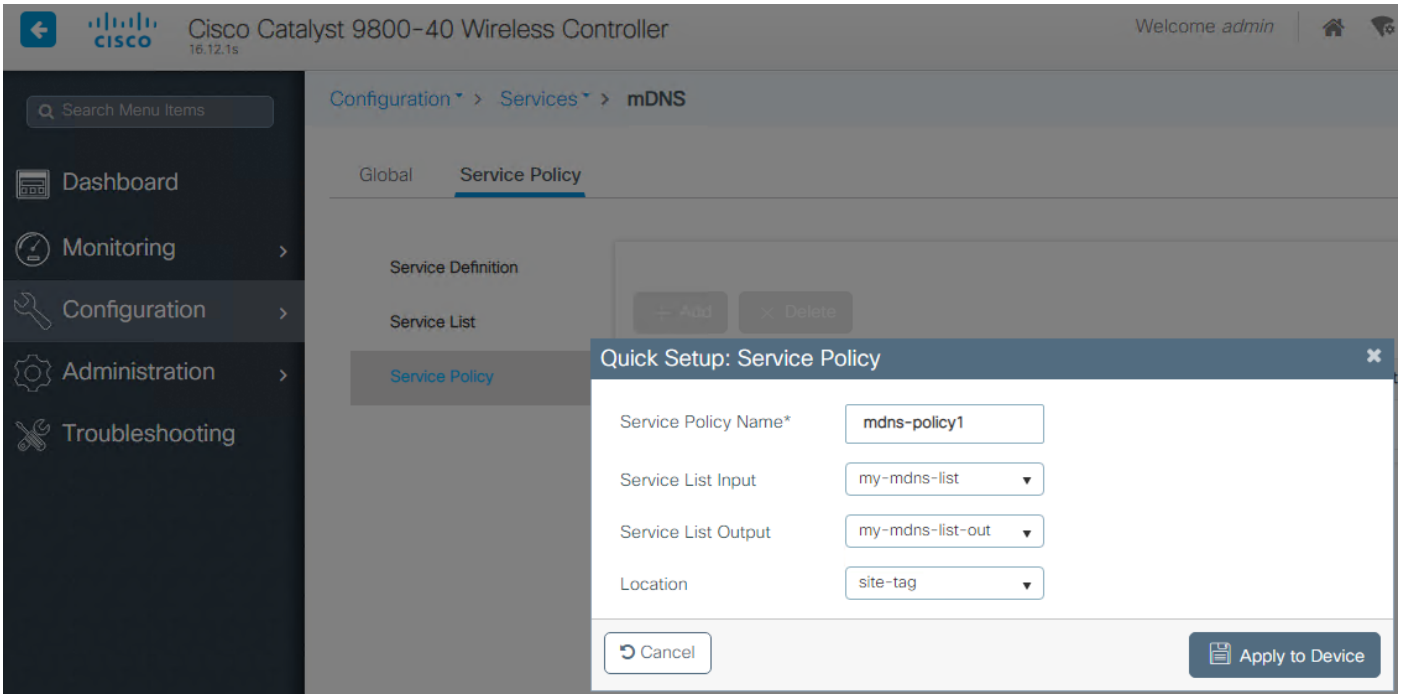
Step 3 (Optional). If you use a custom Service List (Step 2.), you will need to define a custom mDNS Service Policy to be used with those customized Service Lists. Under **Configuration > Services > mDNS > Service Policy, select Service Policy** and follow next steps:

1. Define a **Service Policy Name**.

2. Add your custom Service List IN to **Service List Input**.

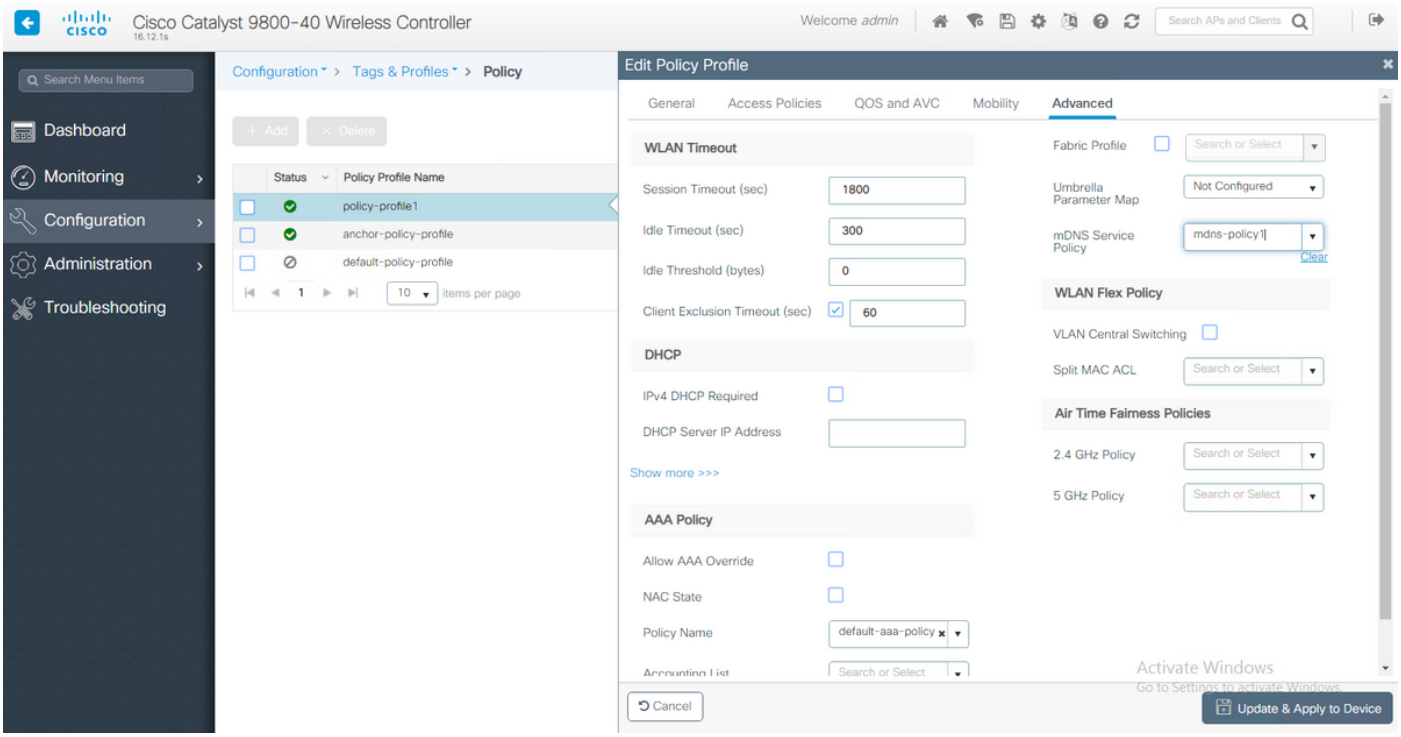
3. Add your customer Service List OUT to **Service List Output**.

4. Under Location choose site-tag, Location Specific Services (LSS), or your preferred available option; in this example, **site-tag** is used as shown in the image.

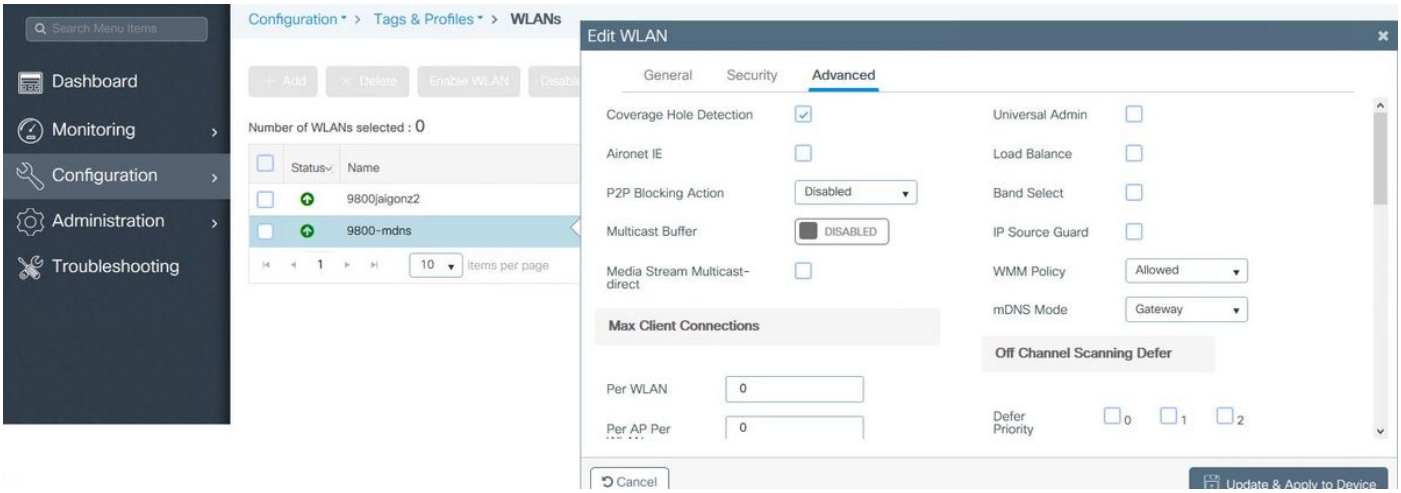


Step 4. (Optional). Passing the mDNS Service Policy to a Policy Profile.

Navigate to **Configuration > Tags & Profiles > Policy > Policy Profile Name > Advanced** and select from the "mDNS Service Policy" drop-down list, the custom mDNS Service Policy previously created (in this example "mdns-policy1"), and then select **Update** and **Apply to Device** as shown in the image.



Step 5. Navigate to **Configuration > Tags & Profiles > WLANs > WLAN > Advanced** and select Gateway on "mDNS mode" drop-down list and then **Update** and **Apply to Device**. The default mode is Bridging (you can use Drop to disable/drop mDNS services on the WLAN) as shown in the image.



If a custom Service Policy is not used, the WLAN uses the "default-mdns-service-policy" assigned to the Policy Profile, which uses the mDNS default-service-list. You can verify the list of default services with the use of this command:

```
C9800#show running-config mdns-sd default-service-list
================================================================================
                mDNS Default Service List
================================================================================
Service Name                                                        PTR Name
================================================================================
airtunes                          :                          _raop._tcp.local

airplay                           :                        _airplay._tcp.local

homesharing                       :                    _home-sharing._tcp.local
```

```
google-chromecast             :                  _googlecast._tcp.local

printer-ipp                   :                       _ipp._tcp.local

printer-ipps                  :                      _ipps._tcp.local

printer-lpd                   :                    _printer._tcp.local

printer-socket                :              _pdl-datastream._tcp.local

itune-wireless-devicesharing2 :               _apple-mobdev2._tcp.local
```

Configure mDNS Gateway via Command Line Interface

Step 1. Enable mDNS globally with the use of these commands:

```
C9800#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
C9800(config)#mdns-sd gateway
C9800(config-mdns-sd)#transport both
C9800(config-mdns-sd)#active-query timer 30
C9800(config-mdns-sd)#exit
C9800(config)#
```

Step 2 (optional). Configure a custom Service List for IN services and add the different services required from the available list:

```
C9800(config)#mdns-sd service-list my-mdns-list IN
C9800(config-mdns-sl-in)#match ?
  airplay                       airplay
  airserver                     airserver
  airtunes                      airtunes
  amazon-fire-tv                amazon-fire-tv
  apple-airprint                apple-airprint
  apple-continuity              apple-continuity
  apple-file-share              apple-file-share
  apple-homekit                 apple-homekit
  apple-itunes-library          apple-itunes-library
  apple-itunes-music            apple-itunes-music
  apple-itunes-photo            apple-itunes-photo
  apple-keynote                 apple-keynote
  apple-rdp                     apple-rdp
  apple-remote-events           apple-remote-events
  apple-remote-login            apple-remote-login
  apple-screen-share            apple-screen-share
  apple-timecapsule             apple-timecapsule
  apple-timecapsule-mgmt        apple-timecapsule-mgmt
  apple-windows-fileshare       apple-windows-fileshare
  fax                           fax
  google-chromecast             google-chromecast
  homesharing                   homesharing
  itune-wireless-devicesharing2 itune-wireless-devicesharing2
  multifunction-printer         multifunction-printer
  phillips-hue-lights           phillips-hue-lights
  printer-ipp                   printer-ipp
  printer-ipps                  printer-ipps
  printer-lpd                   printer-lpd
  printer-socket                printer-socket
```

```
  roku                          roku
  scanner                       scanner
  spotify                       spotify
  web-server                    web-server
  workstation                   workstation

C9800(config-mdns-sl-in)#match airtunes message-type any
C9800(config-mdns-sl-in)#exit
```

Configure a custom Service List for OUT services and add the different services required from the available list:

```
C9800(config)#mdns-sd service-list my-mdns-list-out OUT
C9800(config-mdns-sl-out)#match ?
airplay airplay
airserver airserver
airtunes airtunes
amazon-fire-tv amazon-fire-tv
apple-airprint apple-airprint
apple-continuity apple-continuity
apple-file-share apple-file-share
apple-homekit apple-homekit
apple-itunes-library apple-itunes-library
apple-itunes-music apple-itunes-music
apple-itunes-photo apple-itunes-photo
apple-keynote apple-keynote
apple-rdp apple-rdp
apple-remote-events apple-remote-events
apple-remote-login apple-remote-login
apple-screen-share apple-screen-share
apple-timecapsule apple-timecapsule
apple-timecapsule-mgmt apple-timecapsule-mgmt
apple-windows-fileshare apple-windows-fileshare
fax fax
google-chromecast google-chromecast
homesharing homesharing
itune-wireless-devicesharing2 itune-wireless-devicesharing2
multifunction-printer multifunction-printer
phillips-hue-lights phillips-hue-lights
printer-ipp printer-ipp
printer-ipps printer-ipps
printer-lpd printer-lpd
printer-socket printer-socket
roku roku
scanner scanner
spotify spotify
web-server web-server
workstation workstation

C9800(config-mdns-sl-out)#match airplay
C9800(config-mdns-sl-out)#exit
```

Step 3 (optional). Create a mDNS Service Policy with the use of these commands:

```
C9800(config)#mdns-sd service-policy mdns-policy1
C9800(config-mdns-ser-pol)#location site-tag
C9800(config-mdns-ser-pol)#service-list my-mdns-list IN
C9800(config-mdns-ser-pol)#service-list my-mdns-list-out OUT
C9800(config-mdns-ser-pol)#exit C9800(config)#
```

Step 4 (optional). Add the mDNS Service Policy to the Policy Profile with the use of these commands:

```
C9800(config)#wireless profile policy my-policy-profile
C9800(config-wireless-policy)#mdns-sd service-policy mdns-policy1
Warning! Ensure mDNS service policy is configured globally.
C9800(config-wireless-policy)#exit
```

Step 5. Enable mDNS Gateway in the WLAN with the use of these commands:

```
C9800(config)#wlan 9800-mdns
C9800(config-wlan)#shut
C9800(config-wlan)#mdns-sd gateway
Warning! Ensure global mDNS gateway is configured.
C9800(config-wlan)#no shut
C9800(config-wlan)#exit
```

Anchor-Foreign Scenario

When you implement the mDNS Gateway feature in a mobility Anchor WLAN, where both the Foreign and Anchor WLCs are C9800 and the wireless clients obtain their IP address from VLAN(s) in the Anchor controller, this is the behavior and the required setup:

- The Anchor controller is the one that acts as the mDNS Gateway, caching the services from all the devices connected to that Anchor WLAN and the respective VLAN, and responds for queries to those services cached.
- When it responds to queries, the C9800 Anchor controller will source responses using its SVI IP address of the VLAN assigned to the client asking for the service. Hence, all client VLANs requiring mDNS Services must have an IP address at the SVI in the Anchor.
- mDNS Gateway must be globally enabled on both the Foreign and Anchor WLCs.
- Both the Foreign and Anchor controllers should use the same mDNS Service Policy with same services (default or custom), which should be assigned to the Policy Profile linked to this Anchor WLAN. All these configuration settings are the same steps already covered above in this document.
- The only configuration difference for a mobility Anchor WLAN setup is this; navigate to **WLAN > Advanced** settings, the “mDNS Mode” in the Foreign C9800 must be **Bridging** and in the Anchor C9800 it must be **Gateway**.

Verify

Use this section in order to confirm that your configuration works properly.

Use commands:

```
C9800#show mdns-sd summary
mDNS Gateway: Enabled
Active Query: Enabled
  Periodicity (in minutes): 30
Transport Type: Both IPv4 and IPv6
```

Review if WLC is actually caching mDNS services and which ones (in a mobility Anchor WLAN, this cache should be checked on the Anchor controller), by listing the mDNS cached services with

this command, where you can see the source MAC address of the device that offers the service and even its IP address, along with other mDNS details:

```
C9800#show mdns-sd cache
------------------------------------------------------------ PTR Records ----------------------
--------------------------------------
RECORD-NAME                                  TTL      TYPE  ID    CLIENT-MAC       RR-RECORD-
DATA
------------------------------------------------------------------------------------------------
--------------------------------------
_googlecast._tcp.local                       4500     WLAN  2     48d6.d50c.a620   Chromecast-
Ultra-687f65f66d478b2c787eac8bc7c9efad.

------------------------------------------------------------ SRV Records ----------------------
--------------------------------------
RECORD-NAME                                  TTL      TYPE  ID    CLIENT-MAC       RR-RECORD-
DATA
------------------------------------------------------------------------------------------------
--------------------------------------
Chromecast-Ultra-687f65f66d478b2c787eac8bc7c9  4500     WLAN  2     48d6.d50c.a620   0 0 8009
687f65f6-6d47-8b2c-787e-ac8bc7c9efad.loca

------------------------------------------------------------ A/AAAA Records -------------------
--------------------------------------
RECORD-NAME                                  TTL      TYPE  ID    CLIENT-MAC       RR-RECORD-
DATA
------------------------------------------------------------------------------------------------
--------------------------------------
687f65f6-6d47-8b2c-787e-ac8bc7c9efad.local     4500     WLAN  2     48d6.d50c.a620   172.16.9.11

------------------------------------------------------------ TXT Records ----------------------
--------------------------------------
RECORD-NAME                                  TTL      TYPE  ID    CLIENT-MAC       RR-RECORD-
DATA
------------------------------------------------------------------------------------------------
--------------------------------------
Chromecast-Ultra-687f65f66d478b2c787eac8bc7c9  4500     WLAN  2     48d6.d50c.a620
[172]'id=687f65f66d478b2c787eac8bc7c9efad''cd=9A10

C9800#
```

Troubleshoot

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

If you need to check more details about all the exchanges happening on the C9800, queries, caching behavior, responses, drops, errors, and more, gather these traces at the C9800 while you recreate the issue (connect the device that offers the service and the client asks for the service, let them try to discover the services required):

1. Run this command at C9800: **set platform software trace wncd <0-7> chassis active R0 mdns debug**
2. Reproduce the issue.
3. Finally, run this command to gather the traces enabled: **show platform software trace message wncd <0-7> chassis active R0**

Related Information

- **Troubleshoot and Understand mDNS Gateway on Wireless LAN Controller (WLC)**
- **Technical Support & Documentation - Cisco Systems**