



Configuration

The following topics are covered under this chapter:

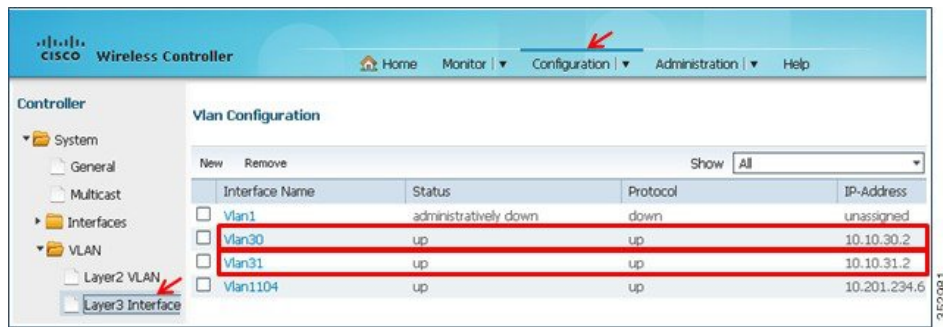
- [Example of Enabling Service Discovery Gateway \(mDNS Gateway—Phase 2\), page 1](#)
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- [Location Aware Bonjour Services, page 11](#)
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Example of Enabling Service Discovery Gateway (mDNS Gateway—Phase 2)

To configure and demonstrate the Service Discovery Gateway feature on WLC5760, we created a VLAN interface for Bonjour Services (AirPlay, AirPrint, and so on) on a separate VLAN than the Client VLAN.

Here is an example showing different VLANs, one for Clients (VLAN30) and another one for mDNS services (AirPlay, AirPrint and so on—VLAN31), configured on the WLC5760. Also, these VLANs are tied to the client WLAN (SSID) and the mDNS Services WLAN (SSID) respectively.

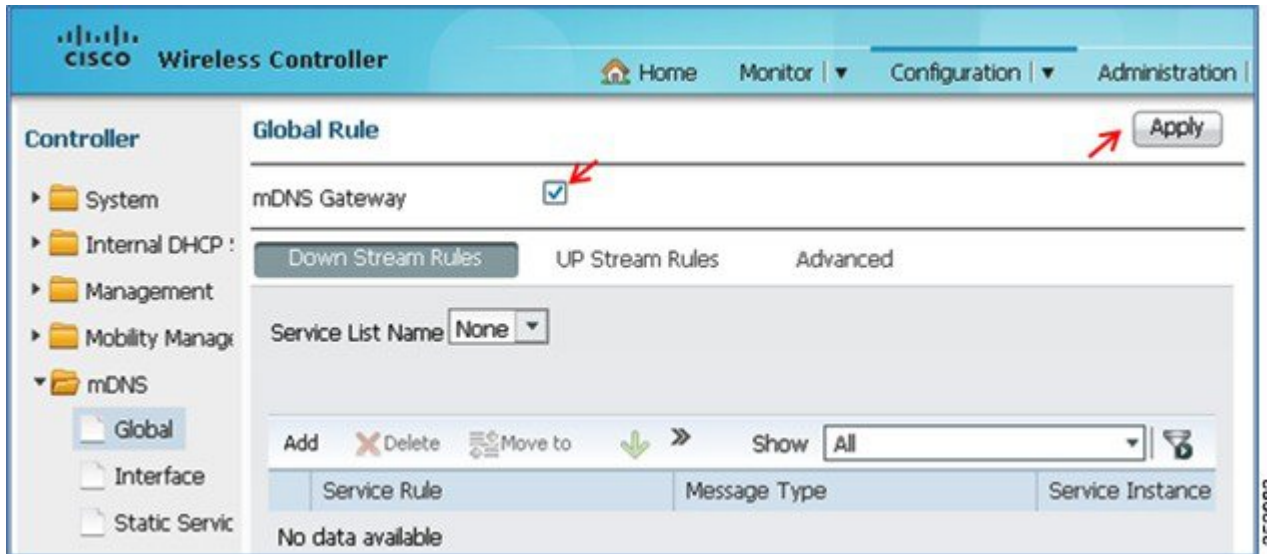
| Cisco Wireless Controller | | | |
|---------------------------|---------|--------------------|-----------|
| VLAN | | | |
| | New | Remove | |
| | VLAN ID | Name | Status |
| <input type="checkbox"/> | 1 | default | active |
| <input type="checkbox"/> | 30 | VLAN0030 | active |
| <input type="checkbox"/> | 31 | VLAN0031 | active |
| <input type="checkbox"/> | 105 | VLAN0105 | active |
| <input type="checkbox"/> | 1002 | foldi-default | act/unsup |
| <input type="checkbox"/> | 1003 | token-ring-default | act/unsup |



Step 1 To enable the Bonjour Gateway feature, go to **Configuration > Controller > mDNS > Global**.

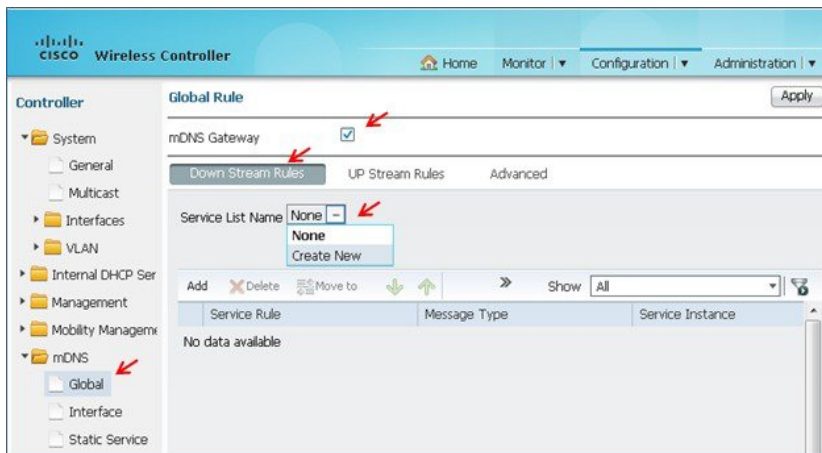


Under **Global Rule**, enable **mDNS Gateway** by checking the **mDNS Gateway** check box and click **Apply**.



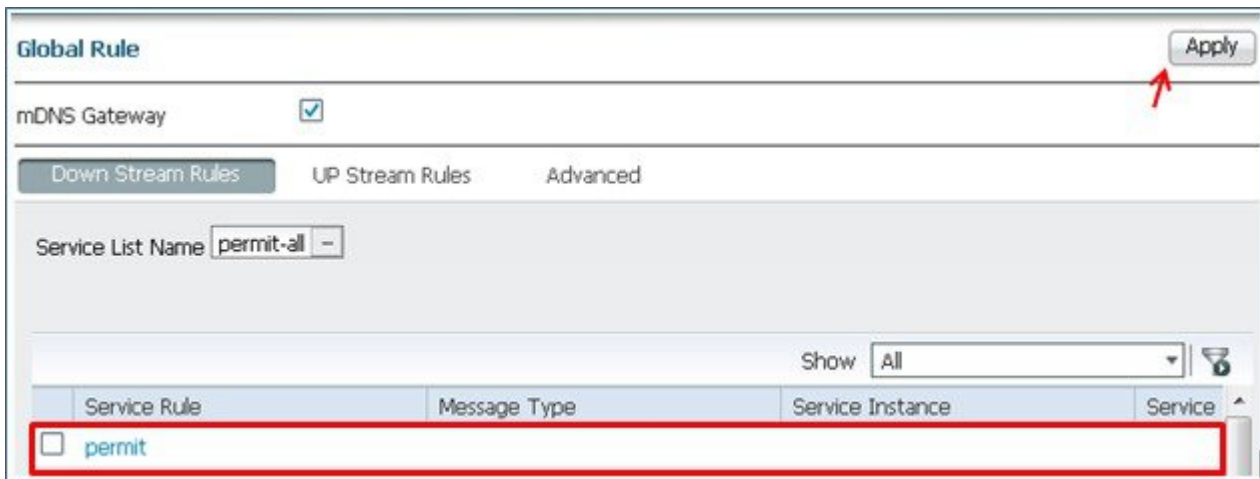
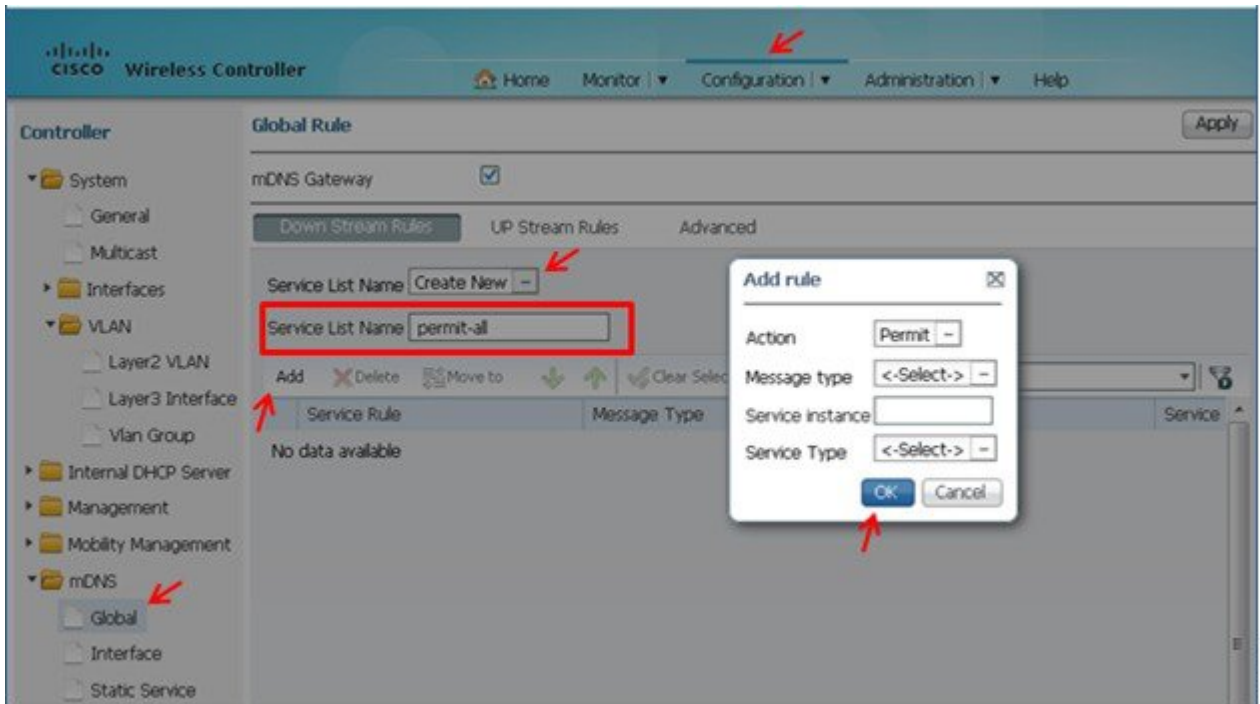
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Step 2 To create a global service list, in the **Down Stream Rules** tab, from the **Service List Name** drop-down list, select **Create New**. Provide an arbitrary name, for example, **permit-all** in the **Service List Name** text box.

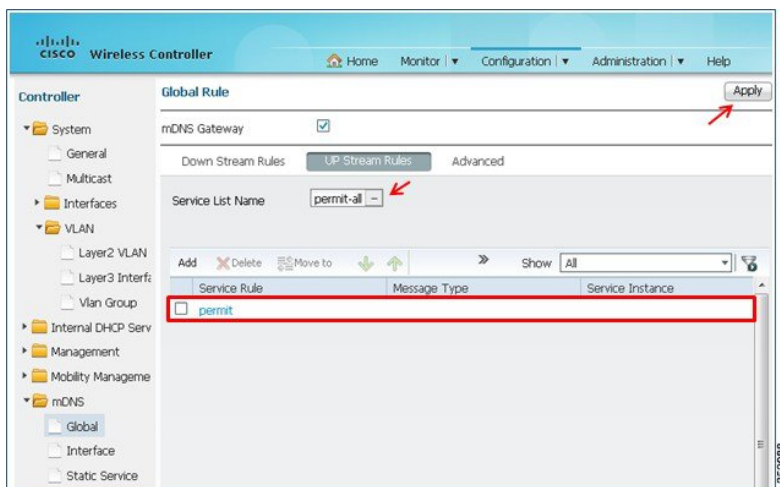
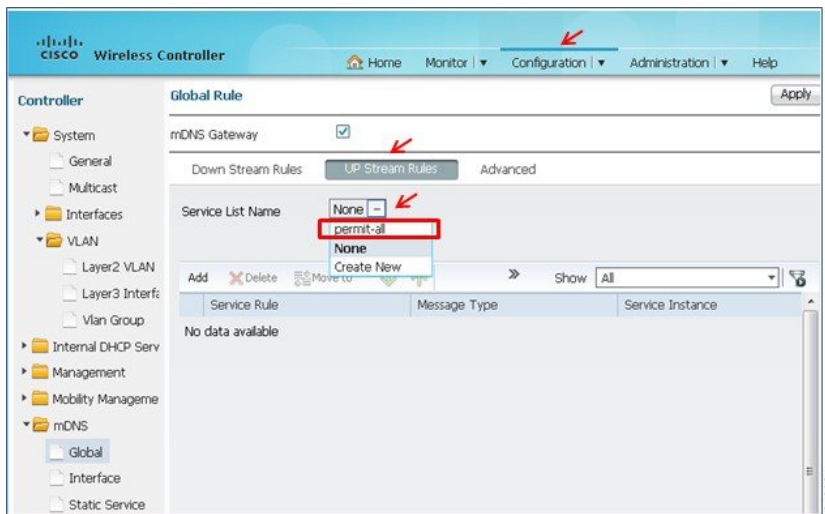


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Step 3 Service lists are made up of service rules that are essentially permit or deny statements matching a certain part of the mDNS record. This match criteria use regular expressions for string matching, for example, message type—announcement or query, service type matching—Airplay, AirTunes and so on, or instance name matching—AirPrint1 or AirPrint2. The global policy allows all services to be learned and cached. Under **mDNS > Global > Down Stream Rules**, click **Add**. In the **Add rule** popup that appears, select **Permit** from the **Action** drop-down list. Click **OK** and **Apply**.

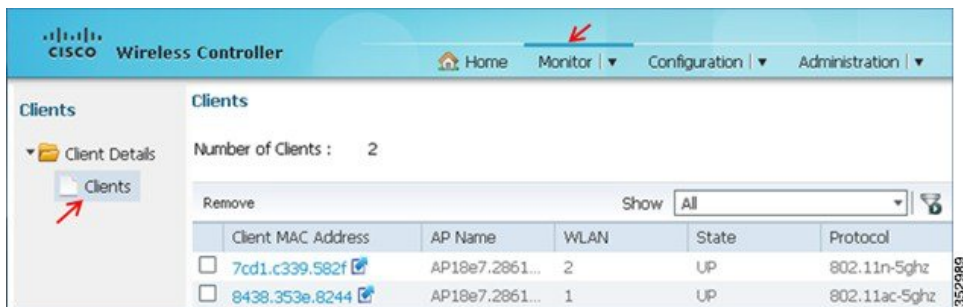


Step 4 Apply the policy that we just created, **permit-all**, in the upstream direction as well. Go to **Configuration > Controller > mDNS > Global**. In the **Up Stream Rules** tab, from the **Service List Name** drop-down list, select **permit-all** and click **Apply**.



Step 5

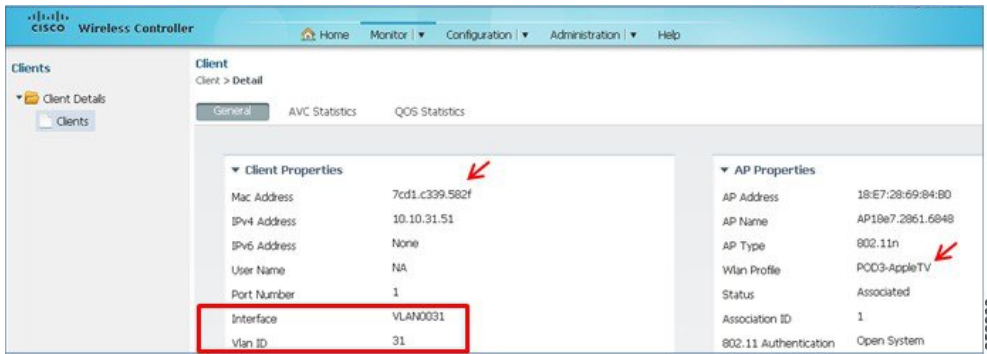
Now, connect the Apple TV to the WLAN for mDNS services (in this setup, it is **POD3-AppleTV**) and the client iOS device (iPad/iPhone) to client WLAN (in this setup, it is **POD3-Client**). Navigate to **Monitor > Clients** and you will see that the Bonjour servicing the Apple TV and the Bonjour Client (your iPad/iPhone) are associated to two different SSIDs as shown below.



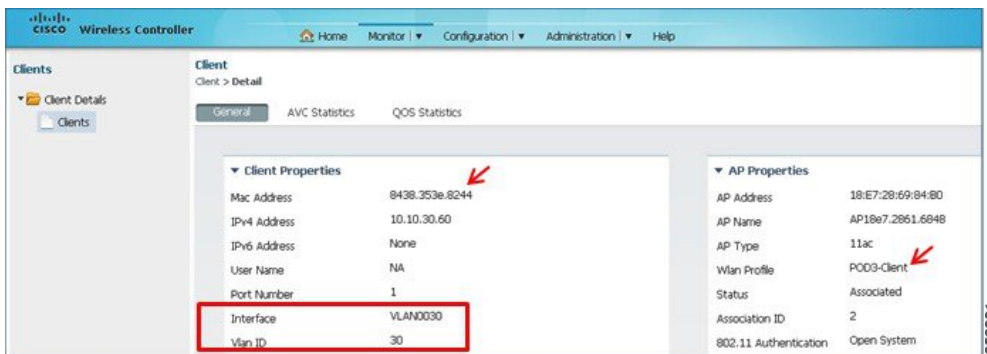
To view client details, click the MAC address of client.

Apple TV:

Example of Enabling Service Discovery Gateway (mDNS Gateway—Phase 2)

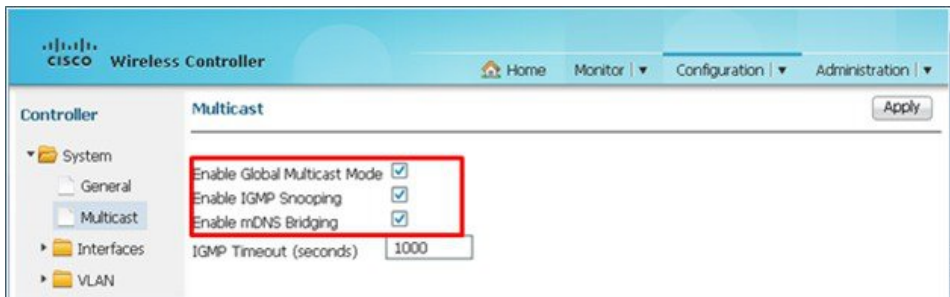


iOS Client:

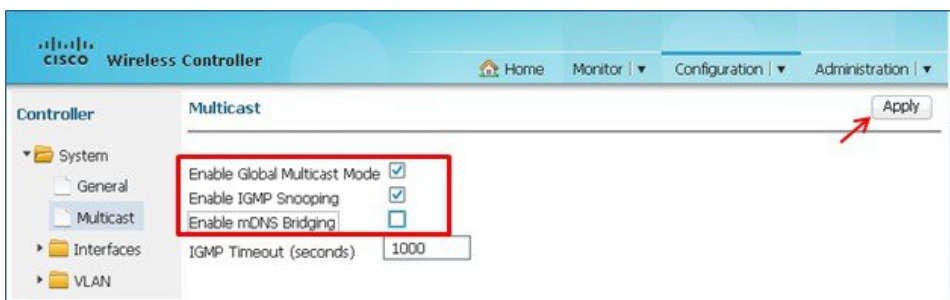


Step 6

When multicast is enabled globally, mDNS bridging is enabled by default. This will cause Bonjour services in the same VLAN as Client to be learnt via mDNS bridging rather than through the mDNS gateway. Therefore, it is recommended to disable mDNS Bridging.



Go to **Configuration > Controller > System > Multicast** and uncheck the **Enable mDNS Bridging** check box and click **Apply**.



Active Queries Configuration

Active Queries are specific filters that actively query for services attached to local segments. This helps to keep services "fresh" in the cache. If a device queries for a specific service, the cache already holds a valid record and it does not need to proxy the service query to the attached network segments, but can respond immediately. This also helps to quickly detect the removal of a service (For example: A device is turned off without proper announcement of the service removal).

Currently, the GUI is not available to configure the active query. Telnet or console into your WLC and configure the following to enable active query:

```


service-list mdns-sd active-query query
 service-type _airplay._tcp.local
 service-type _raop._tcp.local
 service-type _ipp._tcp.local
 service-type _sleep-proxy._udp.local
 service-type _printer._tcp.local
 service-type _scanner._tcp.local
!
service-routing mdns-sd
service-policy-query active-query 60
    
```

Once clients are connected and Global mDNS are enabled, we can confirm the mDNS services that are discovered and cached by navigating to **Monitor > Controller > mDNS > Service Cache**.



Accessing Bonjour Service

- Once the mDNS is enabled and Bonjour services are being cached as shown in above steps, proceed with testing to see if the Bonjour services are routed across the VLANs.
- Make sure your Apple (iPhone/iPad) client is connected to the client WLAN and the Apple TV is connected to a separate WLAN.
- Ensure that the Apple TV has **AirPlay** enabled by checking the **Settings > AirPlay** menu from the home screen. An optional passcode can be set for security.

- On your Apple iOS device, double-click the home button  to reveal the multi-tasking view.
- Swipe left to right (twice for iPhone, once for iPad) to reveal a menu with the AirPlay icon as depicted in the below screenshot. If you are using iOS7, swipe up the screen to see the options.



- Select the Apple TV from the list, and enable mirroring.



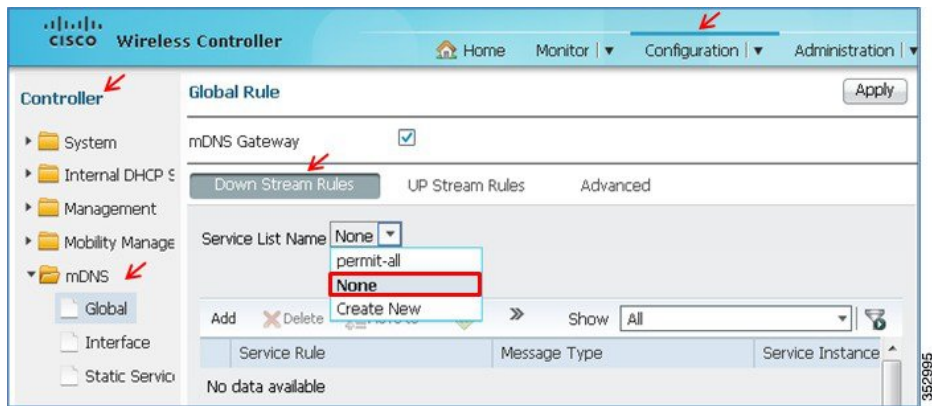
- The status bar of the Apple device will turn blue along with adding an icon for AirPlay, signifying that you are broadcasting your screen on the Apple TV.



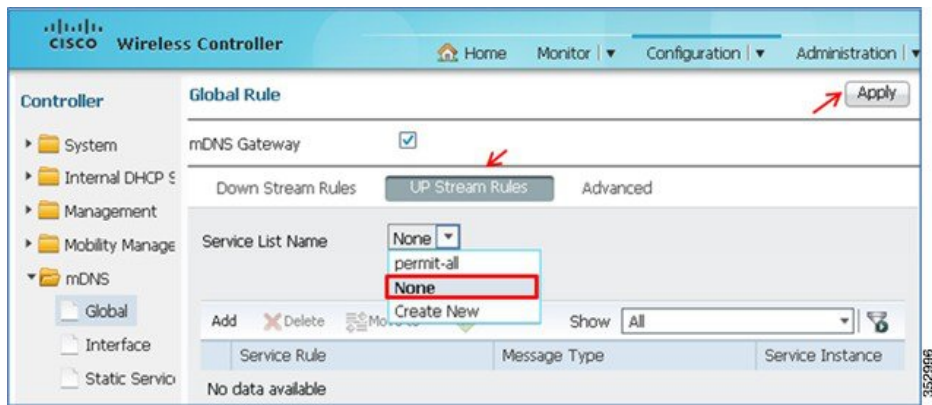
Per-Interface mDNS Configuration

It is possible to restrict the WLC to only learn and cache services available on specific interfaces. In this example, we will remove the global service-list created in the previous section and create a service-list tied to a specific VLAN interface.

- 1 Go to **Configuration > Controller > mDNS > Global**. In the **Down Stream Rules** tab, select **None** from the **Service List Name** drop-down list.



2 In the **UP Stream Rules** tab, select **None** from the **Service List Name** drop-down list.



3 Go to **Configuration > Controller > mDNS > Interface > Vlan Number**.



4 To filter the services to be learnt on only one VLAN, apply the previously created service-list **permit-all** on the VLAN to which the AppleTV is connected. In our example, this is **VLAN 31**.

Go to **Vlan Number > Down Stream Rules** tab and from the **Service List Name** drop-down list, select **permit-all**.



- 5 Also, apply this policy in the upstream direction as well. Go to **Vlan Number** > **UP Stream Rules** tab and from the **Service List Name** drop-down list, select **permit-all** and click **Apply**.



- 6 To receive and process queries from wireless clients, service list must be applied to the client VLAN. For this example, we will apply the same Service List **permit-all** on the client VLAN to which the iOS/Apple client is connected. In our example, this is **VLAN 30**.

Go to **Vlan Number** > **Down Stream Rules** tab and from the **Service List Name** drop-down list, select **permit-all**.



- 7 Also, apply this policy in the upstream direction for the client VLAN. Go to **Vlan Number** > **UP Stream Rules** tab and from the **Service List Name** drop-down list, select **permit-all** and click **Apply**.



- 8 You must wait a minute or so for the query to refresh. Then, verify the interface service lists by mirroring your client to the Apple TV again.



Note Service Rules are processed in sequence. Also, redistribution is not enabled in this configuration.



Note Redistribution is the process of forwarding service announcements to other segments. This is turned off by default. If a service is announced on one segment, it will be recorded in the cache. However, other segments will not see this service instance unless the service is actively queried. If the service should be visible on other segments at the time of its original announcement on the originating segment, redistribution must be enabled.

Location Aware Bonjour Services

Location (proximity) is defined based on the AP neighbor list. When enabled, we identify the AP MAC address to which querying client is associated and leverage the AP neighbor list learned via RRM to define proximity. Proximity based filtering only applies to response filtering and not to redistribution or queries sent out.



Note This is only supported for wireless mDNS services. Wired services will not be filtered.

For Example:

If you have AppleTVs and Bonjour printers in your environment, but want only the AppleTVs within the vicinity/proximity of the client to be made available to the client, you must enable proximity for Airplay services. Assuming that the client is connected to AP 1 that has AP 3, AP 5, and AP 7 in its neighbor list:

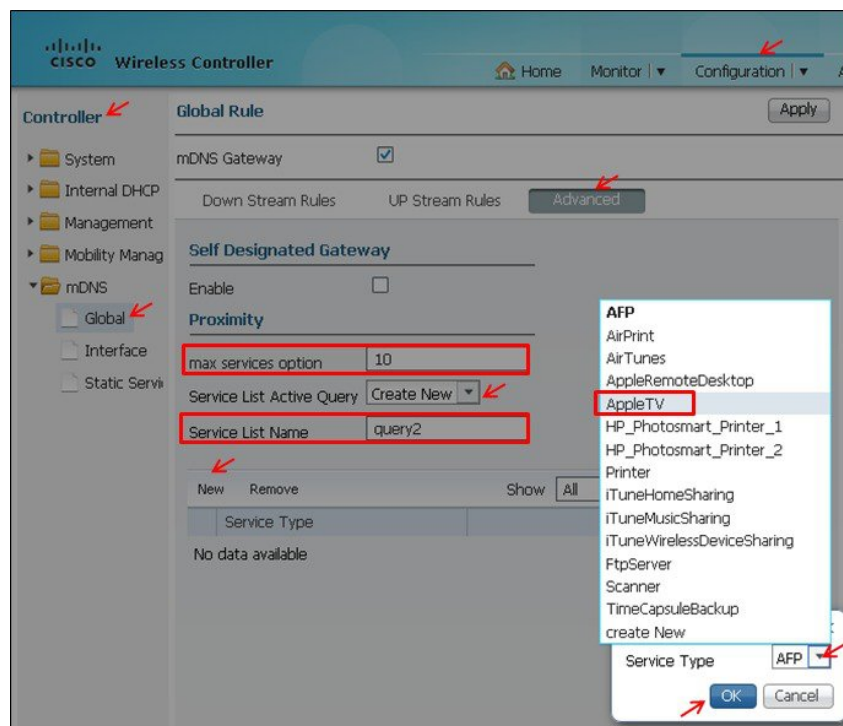
- When the client requests for print services, all printers cached on the WLC are sent in response.
- When the same client requests for Airplay, only Airplay service providers associated to APs 1, 3, 5, and 7 are made available to the client.

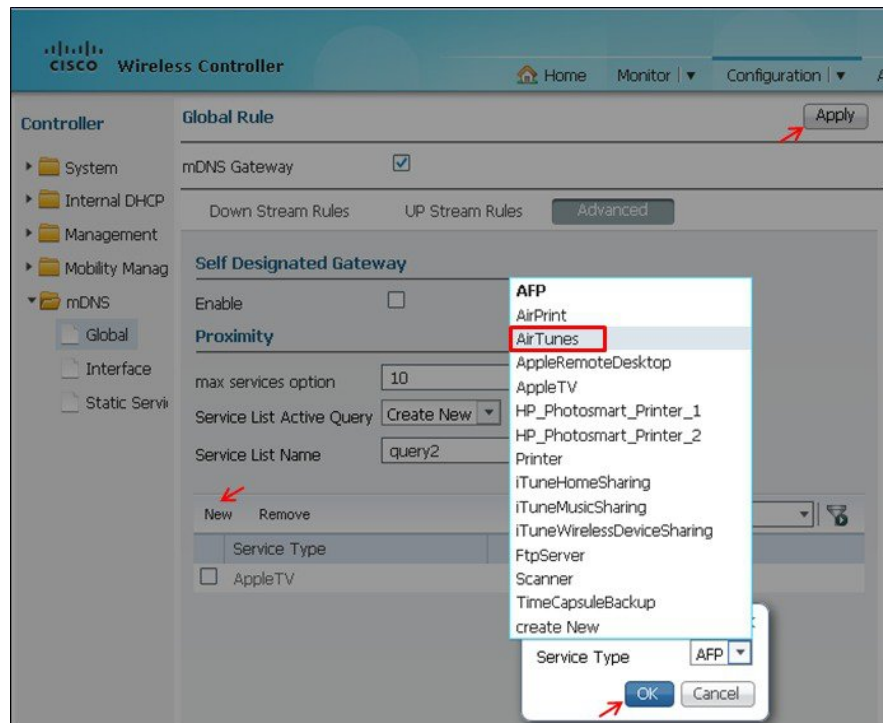
In the following example, we will set up a proximity query called **query2** (you can assign any name you desire) matching Airplay and with the services limit of 10 (you can assign minimum of 1 and maximum of

100 services for **max services option**). This will return only 10 Apple TVs that are in the RF-vicinity of this client's AP.

Complete these steps:

- 1 Go to **Configuration > Controller > mDNS > Global > Advanced** tab.
- 2 In the **Proximity** area, define the **max services option** as **10**.
- 3 From the **Service List Active Query** drop-down list, select **Create New**.
- 4 Enter the **Service List Name** as **query 2**.
- 5 Click **New** and select the **Service Type** as **AppleTV** and click **OK**.
- 6 To add another service type, click **New** and select the **Service Type** as **AirTunes** and then click **OK**.
- 7 Click **Apply**.





At this point, the Apple Client (iPad) will only list the AppleTVs that are associated to the APs in the neighbor list of its own AP.

Proximity filtering works only if the total number of services in the mDNS cache is greater than 10. For example, if the service provider list has lesser than 10 services, all the services are listed irrespective of the presence of AP in the neighbor list. The filtering for neighboring AP occurs only if the service provider list has more than 10 services.

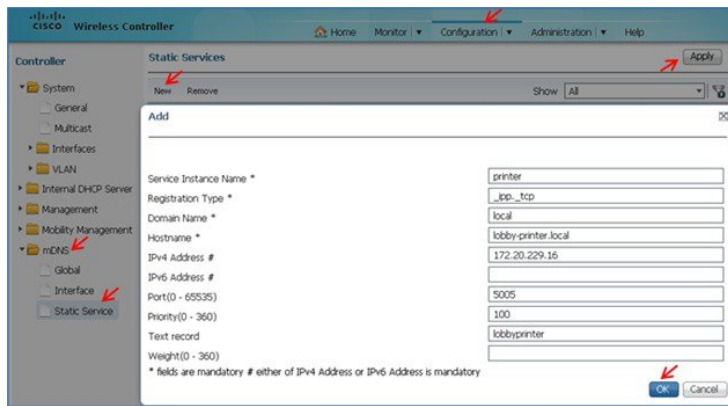
Static Service

You can configure static services that are always present in the cache. This is required for passive Bonjour service providers that are either not capable of advertising on their own or do it infrequently.

In the following example, we will create a static service for a printer in the lobby and verify the services cached for the same.

Complete these steps:

- 1 Go to **Configuration > Controller > mDNS > Static Service** .
- 2 Click **New** and enter the printer details as shown in the figure below.
- 3 Click **OK** and **Apply**.



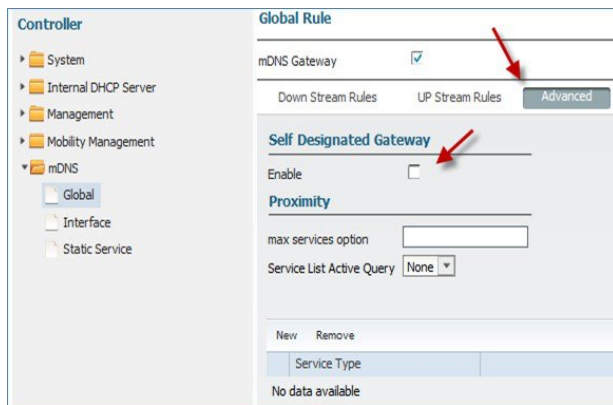
To verify the cached static service entry, go to **Monitor > Controller > mDNS > Static Service Cache**.



Self-Designated Gateway

When multiple mDNS gateways are configured in the same domain, query and announcement packets are received by all mDNS gateways. Network administrators have the option of configuring a Designated Gateway in a given link local domain to address this issue:

Go to **Controller > mDNS > Global > Advanced** tab. Enable **Self Designated Gateway** by checking the **Enable** check box.



Service Type Enumeration

Service Type Enumeration provides an easy way to find the list of advertised service types in large networks where the number of available services are high. When Enumeration is enabled, it will return only one entry in the cache for each service. Note that, this can only be configured via the CLI at this time and no GUI options are available.

```

service-routing mdns-sd
  service-policy permit-all IN
  service-policy permit-all OUT
  service-policy-query query2 100
  service-type-enumeration period 15

show mdns service-types
[<SERVICE NAME>]                [If-name]
_ipp._tcp.local                    V1105
_http._tcp.local                   V1105
_scanner._tcp.local                V1105
_http-alt._tcp.local               V1105
_printer._tcp.local                V1105
_pdl-datastream._tcp.local         V1105
_airplay._tcp.local                V131
_raop._tcp.local                   V131
_sleep-proxy._udp.local            V131
_touch-able._tcp.local             V131

```

Civic Location (Location Awareness for Wired Services)

Wired mDNS service filtering options allow or disallow services that are learnt from or announced to civic location templates. The civic location template includes fields such as country, city, street, building name, and so on. These attributes of the fields are configured and matched with the location template in the wired interface.

In the following example, the filtering enhancement refers to the template ID (corp-office) of the location module, and the actual attributes, for example—city, building name and so on are configured as part of the location template.

Example Configuration 1:

```

location civic-location identifier corp-office
  name SJC-14
  number 14
  floor 1

int gig 1/0/1
no switchport
location civic-location-id corp-office
ip address 15.1.1.1 255.255.255.0
end

service-list mdns-sd Location-1 permit 10
  match location civic corp-office
service-routing mdns-sd

```

Example Configuration 2:

The following is a detailed example of the IN and OUT filtering process using civic location criteria with configuration and use cases.

The OUT filtering use case: To prevent clients in Building-2 from learning the printer services advertised in Building-1.

Building 1 devices are in VLAN 200, 400. Building 2 devices are in VLAN 100, 300.

```

location civic-location identifier Building-1

building Building-1

location civic-location identifier Building-2

```

```
building Building-2

service-list mdns-sd building-2-list-out deny 20

match service-type _ipp._tcp.local
match location civic Building-1

Service-list mdns-sd building-2-list-out permit 40

service-list mdns-sd building-1-list-out deny 20

match service-type _ipp._tcp.local
match location civic Building-2

Service-list mdns-sd building-1-list-out permit 40

Service-list mdns-sd permit-all permit 20

Service-routing mdns-sd

Service-policy permit-all in

Service-policy permit-all out

interface Ethernet0/0

! Building 2 is connected to the interface in vlan 100

location civic-location-id Building-2

switchport access vlan 100

switchport mode access

Service-routing mdns-sd

  Service-policy building-2-list-out OUT // When a query is received from the client in
vlan 100 (building 2),
building-2-list-out is applied that denies printers from building 1, but allows everything
else.

interface Ethernet1/0

location civic-location-id Building-2

switchport access vlan 300

switchport mode access

Service-routing mdns-sd

  Service-policy building-2-list-out OUT

interface Ethernet2/0
location civic-location-id Building-1
switchport access vlan 200
switchport mode access

Service-routing mdns-sd

  Service-policy building-1-list-out OUT

interface Ethernet3/0
location civic-location-id Building-1
switchport access vlan 400
switchport mode access

Service-routing mdns-sd

  Service-policy building-1-list-out OUT
```


The IN filtering use case: To prevent the mDNS cache from learning apple TVs advertised in the Dorm-room. In the following example, e0/0 vlan 100 is connected to the Dorm-room, while other ports are terminated in class-rooms.



Note You can configure ports to be in Dorm-room/Class-room as in example below.

```

location civic-location identifier Dorm-room
    building Dorm-room
location civic-location identifier Class-room
    building class-rooms
Service-list mdns-sd example deny 10
    Match service-type _airplay._tcp.*
    Match location Dorm-room
Service-list mdns-sd example permit 20
Service-list mdns-sd permit-all permit 20
Service-routing mdns-sd
    Service-policy example IN
    Service-policy permit-all OUT

interface Ethernet0/0
! Dorm room is connected to interface in vlan 100
location civic-location-id Dorm-room
switchport access vlan 100
switchport mode access
interface Ethernet1/0
location civic-location-id Class-room
switchport access vlan 300
switchport mode access

```

Service Discovery Gateway Summary

- 5760 (14K services), 3850 (2K services), and 3650 (2K services).
- Supported with Centralized and Converged Access mode.
- Detect wired and wireless services on VLAN L2 adjacent to the WLC.
- Each Bonjour service has an advertised Time To Live (TTL). The controller will ask the device for an update at 85% of this TTL.

