Service Discovery Gateway

The Service Discovery Gateway feature enables multicast Domain Name System (mDNS) to operate across Layer 3 (L3) boundaries (different subnets). An mDNS gateway is able to provide transport for service discovery across Layer 3 boundaries by filtering, caching and redistributing services from one L3 domain (subnet) to another.

Prior to implementation of this feature, mDNS was limited in scope to within a subnet due to the use of link-local scoped multicast addresses. This feature enhances Bring Your Own Device (BYOD).

Information About Service Discovery Gateway

Sample scenario

Consider the scenario in the above image. If the mDNS gateway functionality is enabled on the router, then service information can be sent from one subnet to another and vice-versa. For example, the printer and fax service information being advertised in the network with IP address 192.0.2.6 are redistributed to the network with IP address 198.51.100.4. Ultimately, the printer and fax service information in the in the network with IP address 192.0.2.6 is learnt by mDNS-enabled hosts and devices in the other network.

Filtering

You can filter services that you want to redistribute. While creating a service–list, the permit or deny option must be used. The permit option allows you to permit/transport specific service–list information. The deny option allows you to deny service–list information that is available to be transported to other subnets. You

need to mention a sequence number when using the permit or deny option. The same service–list name can be associated with multiple sequence numbers and each sequence number will be mapped to a rule.

> **Note**   If no filters are configured, the default action is to deny service–list information to be transported through the device or interface.

Query is another option provided while creating service–lists. You can create queries using a service–list. If you want to browse for a service, then active queries can be used. This helps to keep the records refreshed in the cache.

> **Note**   Active queries can only be used globally and cannot be used at the interface level.

A service end–point (such as, a printer, fax, and so on) sends unsolicited announcements when a service starts up. After that, it sends unsolicited announcements whenever a network change event occurs (such as, an interface coming up or going down, and so on). The device always respond to queries.

After creating a service–list and using the permit or deny option, you can filter by using match statements (commands) based on service–instance, service–type, or message–type (announcement or query).

How to Configure Service Discovery Gateway

Creating a Service-list, Applying a Filter for the Service-List and Configuring Parameters for the Service-List Name

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **service-list mdns-sd** *service-list-name* {**deny** *sequence-number* | **permit** *sequence-number* | **query**}
4. **match message-type** {**announcement** | **any** | **query** } **OR match service-instance** {*instance-name* | **any** | **query**} **OR match service-type** *mDNS-service-type-string*
5. **exit**

DETAILED STEPS

	Command or Action	**Purpose**
Step 1	**enable** **Example:** `Device> enable`	Enables privileged EXEC mode. • Enter your password if prompted.

	Command or Action	**Purpose**
Step 2	**configure terminal** **Example:** Device# configure terminal	Enters global configuration mode.
Step 3	**service-list mdns-sd** *service-list-name* {**deny** *sequence-number* | **permit** *sequence-number* | **query**} **Example:** Device(config)# service-list mdns-sd sl1 permit 3 Or Device(config)# service-list mdns-sd sl4 query	Enters mdns service discovery service-list mode. • Creates a service-list and applies a filter on the service-list according to the **permit** or **deny** option applied to the sequence number. Or • Creates a service-list and associates a query for the service-list name if the **query** option is used.

Step 4	**match message-type** {**announcement** | **any** | **query** } **OR match service-instance** {*instance-name* | **any** | **query**} **OR match service-type** *mDNS-service-type-string*
	
	Example:
	Do one of the following:
	
	Device(config-mdns-sd-sl)# match message-type announcement
	
	            OR
	
	Device(config-mdns-sd-sl)# match service-instance servInst 1
	
	            OR
	
	Device(config-mdns-sd-sl)# match service-type _ipp._tcp
		Use one (or more) of the following commands.
		
		Configures parameters for a service-list name that is created using step 3.
		
		Note You cannot use the **match** command if you have used the **query** option in the previous step. The **match** command can be used only for the **permit** or **deny** option.

Step 5	**exit** **Example:** Device(config-mdns-sd-sl)# exit	Returns to global configuration mode.

Enabling mDNS Gateway for a Device and Redistributing Services

After enabling mDNS gateway for a device, you can apply filters (apply IN-bound filtering or OUT-bound filtering) and active queries by using **service-policy** and **service-policy-query** commands respectively. You can redistribute services and service announcements using the **redistribute mdns-sd** command, and set some part of the system memory for cache using the **cache-memory-max** command.

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Note Steps 4 to 7 are optional and not meant to be used in any specific order.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **service-routing mdns-sd**
4. **match service-instance** *service-policy-name* {**IN** | **OUT**}
5. **redistribute mdns-sd**
6. **cache-memory-max** *cache-config-percentage*
7. **service-policy-query** *service-list-query-name service-list-query-periodicity*
8. **exit**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Device> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Device# configure terminal`	Enters global configuration mode.
Step 3	**service-routing mdns-sd** **Example:** `Device(config)# service-routing mdns-sd`	Enables mDNS gateway functionality for a device and enters multicast DNS configuration (config-mdns) mode.

Step 4	**match service-instance** *service-policy-name* {**IN** | **OUT**}
	
	 Example:
	
	 `Device(config-mdns)# service-policy serv-pol1`
	 `IN`
		For a service-list, applies a filter on incoming service discovery information (IN-bound filtering) or outgoing service discovery information (OUT-bound filtering).

Step 5	**redistribute mdns-sd** **Example:** `Device(config-mdns-sd-sl)# exit`	Returns to global configuration mode. **Note** If redistribution is enabled globally, global configuration is given higher priority than interface configuration.

	Command or Action	Purpose
Step 6	**cache-memory-max** *cache-config-percentage* **Example:** Device(config-mdns)# cache-memory-max 20	Sets some part of the system memory (in percentage) for cache. **Note** By default, 10% of the system memory is set aside for cache. You can override the default value by using this command.
Step 7	**service-policy-query** *service-list-query-name service-list-query-periodicity* **Example:** Device(config-mdns)# service-policy-query sl-query1 100	Configures service-list-query periodicity.
Step 8	**exit** **Example:** Device(config-mdns)# exit	Returns to global configuration mode.

Verifying and troubleshooting Service Discovery Gateway

Note The show and debug commands mentioned below are not in any specific order.

SUMMARY STEPS

1. **show mdns requests** [**detail** | *name record-name* | **type record-type** [*name record-name*]]
2. **show mdns cache** [**interface** *type number* | **name** *record-name*[**type** *record-type*] | **type** *recod-type*]
3. **show mdns statistics** {**all** | **service-list***list-name* | **service-policy** {**all** | **interface** *type number*}}
4. **debug mdns** {**all error event packet verbose**}

DETAILED STEPS

Step 1 **show mdns requests** [**detail** | *name record-name* | **type record-type** [*name record-name*]]

Example:
```
Device# show mdns requests detail

MDNS Outstanding Requests
======================================================
Request name  :   _ipp._tcp.local
Request type  :   PTR
Request class :   IN
```
This command displays information for outstanding mDNS requests, including record name and record type information.

Step 2   **show mdns cache** [**interface** *type number* | **name** *record-name*[**type** *record-type*] | **type** *recod-type*]

Example:
```
Device# show mdns cache

mDNS CACHE
========================================================================================
[<NAME>]                                          [<TYPE>][<CLASS>] [<TTL>/Remaining] [Accessed]
 [If-index] [<RR Record Data>]

_services._dns-sd._udp.local                       PTR     IN      4500/4496                0
     3       _ipp._tcp.local

_ipp._tcp.local                                    PTR     IN      4500/4496                1
     3       printer1._ipp._tcp.local

printer1._ipp._tcp.local                           SRV     IN      120/116          1       3
     0       0       5678     smuchala-WS.local

printer1._ipp._tcp.local                           TXT     IN      4500/4496                1
     3       (1)''

smuchala-WS.local                                  A       IN      120/116          1       3
     192.168.183.1
```
This command displays mDNS cache information.

Step 3   **show mdns statistics** {**all** | **service-list**ance-name | **service-policy** {**all** | **interface** *type number*}}

Example:
```
Device# show mdns statistics all

mDNS Statistics
 mDNS packets sent      : 0
 mDNS packets received  : 31
 mDNS packets dropped   : 8
 mDNS cache memory in use: 64264(bytes)
```
This command displays mDNS statistics.

Step 4   **debug mdns** {**all error event packet verbose**}

Example:
```
Device# debug mdns
```
This command enables all mDNS debugging flows.

Configuration Examples for Service Discovery Gateway

Example: Creating a Service-List, Applying a Filter for the Service-List and Configuring Parameters for the Service-List Name

The following example shows creation of a service-list sl1. The permit option is being applied on sequence number 3 and all services with message-type announcement are filtered and available for transport across various subnets associated with the device.

```
Device(config)# service-list mdns-sd sl1 permit 3
Device(config-mdns-sd-sl)# match message-type announcement
Device(config-mdns)# exit
```

Example: Enabling Mdns Gateway for a Device and Redistributing Services

The following example shows how to enable an mDNS gateway for a device and enable redistribution of services across subnets. IN-bound filtering is applied on the service-list serv-pol1. 20% of system memory is made available for cache and service-list-query periodicity is configured at 100 seconds.

```
Device(config)# service-routing mdns-sd
Device(config-mdns)# service-policy serv-pol1 IN
Device(config-mdns)# redistribute mdns-sd
Device(config-mdns)# cache-memory-max 20
Device(config-mdns)# service-policy-query sl-query1 100
Device(config-mdns)# exit
```

Additional References for Service Discovery Gateway

Related Documents

Related Topic	Document Title
Master Command List	Cisco IOS Master Command List
IP Addressing Services Command Reference	Cisco IOS IP Addressing Services Command Reference
Configuring DNS	IP Addressing: DNS Configuration Guide
DNS conceptual information	"Information About DNS" section in IP Addressing: DNS Configuration Guide

Standards and RFCs

Standard/RFC	Title
RFC 6763	DNS-Based Service Discovery
Multicast DNS Internet-Draft	Multicast DNS

MIBs

MIB	MIBs Link
No new or modified MIBs are supported by this feature, and support for existing MIBs has not been modified by this feature.	To locate and download MIBs for selected platforms, Cisco IOS releases, and feature sets, use Cisco MIB Locator found at the following URL: http://www.cisco.com/go/mibs

Technical Assistance

Description	Link
The Cisco Support website provides extensive online resources, including documentation and tools for troubleshooting and resolving technical issues with Cisco products and technologies. To receive security and technical information about your products, you can subscribe to various services, such as the Product Alert Tool (accessed from Field Notices), the Cisco Technical Services Newsletter, and Really Simple Syndication (RSS) Feeds. Access to most tools on the Cisco Support website requires a Cisco.com user ID and password.	http://www.cisco.com/support

Feature Information for Service Discovery Gateway

The following table provides release information about the feature or features described in this module. This table lists only the software release that introduced support for a given feature in a given software release train. Unless noted otherwise, subsequent releases of that software release train also support that feature.

Use Cisco Feature Navigator to find information about platform support and Cisco software image support. To access Cisco Feature Navigator, go to www.cisco.com/go/cfn. An account on Cisco.com is not required.

Table 1: Feature Information for Service Discovery Gateway

Feature Name	Releases	Feature Information
Service Discovery Gateway	Cisco IOS Release 15.2(1)E 15.1(2)SY	The Service Discovery Gateway feature enables multicast Domain Name System (mDNS) to operate across L3 boundaries (different subnets). The following commands were introduced or modified: **cache-memory-max, clear mdns cache, clear mdns statistics, debug mdns, match message-type, match service-instance, match service-type, redistribute mdns-sd, service-list mdns-sd, service-policy, service-policy-query, service-routing mdns-sd, show mdns cache, show mdns requests, show mdns statistics**

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