FORESCOUT

Forescout

Core Extensions Module: DHCP Classifier Plugin

Configuration Guide

Version 2.3

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About the Documentation

- Refer to the Technical Documentation page on the Forescout website for additional documentation: https://www.Forescout.com/company/technical-documentation/
- Have feedback or questions? Write to us at documentation@forescout.com

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Table of Contents

About the DHCP Classifier Plugin 4
What to Do 4

Requirements 5
Ensure That the Component Is Running 5

Concepts, Components, Considerations 5
Concepts 6
Components 8
Deployment Considerations 8
Detect Hosts without Known IP Addresses 8

Configure and Test the Plugin 9

Use DHCP Properties in Policies 10
DHCP Properties 11
Extend DHCP Fingerprint Values 14

Core Extensions Module Information 16

Additional Forescout Documentation 17
Documentation Downloads 17
Documentation Portal 18
Forescout Help Tools 18

About the DHCP Classifier Plugin

The DHCP Classifier Plugin is a component of the Forescout Core Extensions Module. See Core Extensions Module Information for details about the module.

The DHCP Classifier Plugin extracts host information from DHCP messages. Hosts communicate with DHCP servers to acquire and maintain their network addresses. The Forescout platform extracts host information from DHCP message packets and uses DHCP fingerprinting to determine the operating system and other host configuration information.

The information retrieved by this plugin complements information sources used by Forescout eyeSight, such as the HPS Inspection Engine and Nmap queries.

- This plugin lets eyeSight retrieve host information when methods such as the Forescout Packet Engine or HPS Nmap scanner are unavailable, or in situations where eyeSight cannot monitor all traffic. For example, if traffic in a network segment cannot be monitored directly, a CounterACT Appliance on another segment can extract host information based on relayed DHCP messaging.
- This plugin can be used in concert with the above discovery methods to obtain timely, complete host information.
- This plugin reveals DHCP properties that can be used to improve classification of unclassified devices obtained from DHCP-enabled network-connected devices.

  For a list of these properties, see DHCP Properties.

What to Do

Perform the following steps, in order, to carry out the integration:

- Verify that the requirements are met. See Requirements for details.
- Review configuration and deployment considerations. See Deployment Considerations for details.
- Ensure That the Component Is Running.
- Test the plugin. See Configure and Test the Plugin for details.
- (Optional) Use DHCP Properties in policies to improve classification. See Use DHCP Properties in Policies for details.

Requirements

The plugin requires the following:

- Forescout version 8.2
- Endpoint Module version 1.2 with the HPS Inspection Engine running. The DHCP Classifier Plugin relies on information from *Primary Classification* templates and policies provided by the HPS Inspection Engine.
- The endpoint (computer or any other network-aware device) must be configured to send a DHCP broadcast query requesting necessary information to a DHCP server.
- For endpoint DHCP classification, the DHCP Classifier Plugin must be running on a CounterACT device capable of receiving the DHCP client requests from traffic inspection or explicit message forwarding.

Ensure That the Component Is Running

After installing the component (and configuring it, if necessary), ensure that it is running.

To verify:

1. Select **Tools** > **Options** > **Modules**.
2. Navigate to the component and hover over the name to view a tooltip indicating if it is running on Forescout devices in your deployment. In addition, next to the component name, you will see one of the following icons:
   -  - The component is stopped on all Forescout devices.
   -  - The component is stopped on some Forescout devices.
   -  - The component is running on all Forescout devices.
3. If the component is not running, select **Start**, and then select the relevant Forescout devices.
4. Select **OK**.

Concepts, Components, Considerations

This section provides background information and guidelines for configuring network nodes to work with this plugin. It covers the following information:

- Concepts – How this plugin audits DHCP messaging.
- Components – Nodes in your network that participate in DHCP messaging, and their interaction with Forescout eyeSight to support this plugin.
- Deployment Considerations – Setup details and common network structure issues to keep in mind when you implement this plugin.

Concepts

Dynamic Host Configuration Protocol (DHCP) determines how endpoints in a network identify themselves and communicate in the network. Hosts query DHCP servers to acquire and maintain their network addresses and other routing information. When an endpoint joins the network, it broadcasts a request for an IP address. DHCP servers reply, offering an available IP address, IP gateway, DNS server IP, and possibly other information as well.

In addition to obtaining IP networking information, the DHCP protocol has the flexibility to exchange vendor-specific information about the hardware or operating system of the device. This exchange is done by using DHCP options as defined by RFC 2132 and other relevant RFCs. For more information, see http://www.rfc-editor.org/info/rfc2132 .

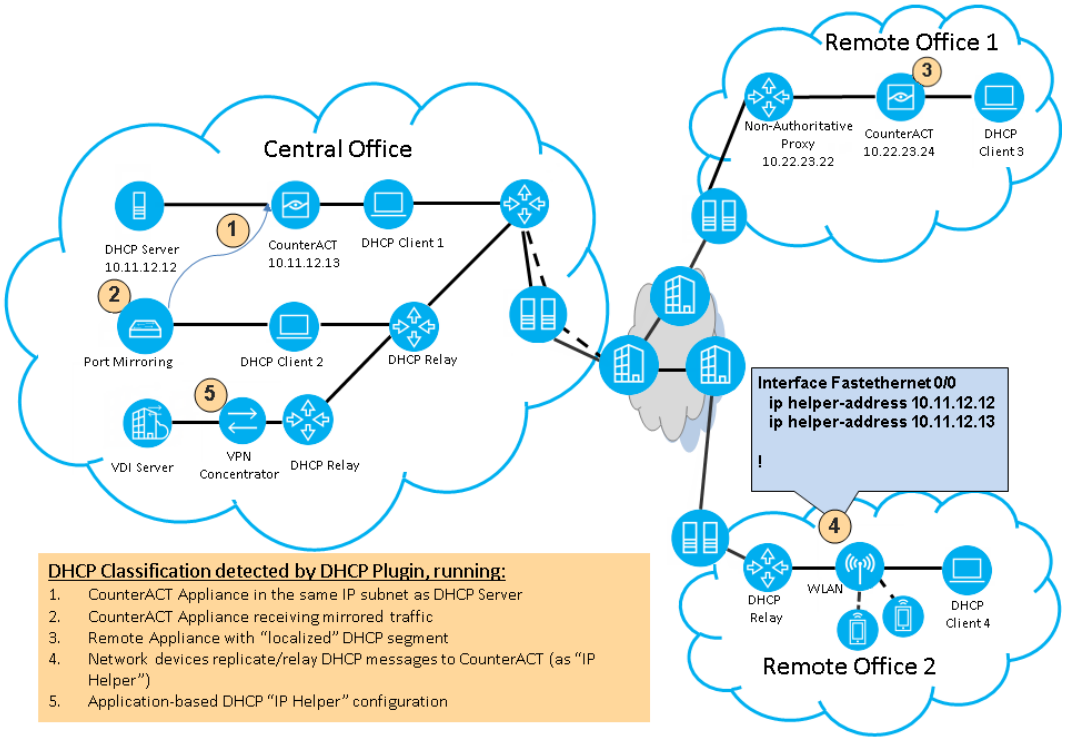
The DHCP Classifier Plugin allows you to leverage DHCP request message options by using vendor-, device-, and OS-dependent differences in the DHCP packets generated by various devices to support the endpoint device classification process.

> *The plugin is passive and does not intervene with the underlying DHCP exchange. Instead, it inspects the client request messages (DHCP fingerprint) to propagate DHCP information about the connected client to Forescout eyeSight (such as operating system and other host configuration information).*

While DHCP fingerprinting yields information quickly before in-depth discovery can take place, the values gleaned from DHCP messaging may be partial or inconclusive. For example:

- A device can have multi-NIC configuration – such as a laptop with wired and wireless NICs. The plugin handles each NIC as a separate host.
- Similarly, devices may have more than one IP address. DHCP properties reflect the most recent IP address detected by Forescout eyeSight.
- A device with a static IP does not invoke DHCP interaction and is invisible to the plugin.
- DHCP fingerprinting is based on a common subset of DHCP fingerprinting data. Therefore, the DHCP Classifier Plugin may be unable to classify device or OS class values, either because a specific fingerprint is unknown to the plugin, or because the fingerprint maps to multiple or different device or OS class values or both.

The following diagram provides an overview of the capabilities of the DHCP Classifier Plugin. It provides a conceptual outline of theoretical deployment possibilities, indicating the various ways that eyeSight detects DHCP messages.



The figure above shows the following typical routing paths for DHCP traffic:

DHCP Classification learned from traffic inspection: (No additional network configuration needed.)

- Example 1 – The CounterACT device (10.11.12.13) monitors DHCP broadcast messages (Client1) from the same IP subnet.
- Example 2 – The CounterACT device (10.11.12.13) receives mirrored traffic from DHCP directly (Client2).
- Example 3 – The CounterACT device (10.22.23.24) monitors DHCP broadcast messages (Client3).

DHCP Classification learned from replicated messages: (DHCP traffic is replicated to a CounterACT device acting as an additional, or secondary, DHCP server. Additional network configuration needed.)

- Example 4 – The CounterACT device (10.11.12.13) receives explicit DHCP requests (Client4) forwarded/replicated from network devices in Remote Office 2.
- Example 5 – The CounterACT device (10.11.12.13) receives replicated/forwarded DHCP requests from an application or network service (such as a VPN Concentrator or Virtual Desktop Infrastructure Server).

Components

The following components are typically involved in DHCP interactions:

Several ***DHCP Servers*** are deployed in the network to handle configuration and information requests.

When an ***endpoint*** is first admitted to a segment of the network, it broadcasts a DHCP request message, expecting a DHCP server to respond.

In some cases, network devices, such as routers, pass DHCP messages to DHCP Servers on other segments. When this happens, the network device serves as a ***DHCP Relay*** or ***IP Helper*** (different vendors may use different names for this term).

Sometimes ***edge devices*** for segmented traffic such as VPN Concentrators, Wireless Access Points, or Virtual Desktop Infrastructure (VDI) handle similar configuration requests for their clients or act as gateways to a DHCP server.

Deployment Considerations

- Identify network devices providing DHCP services and ensure that you have one or more CounterACT devices running the DHCP Classifier Plugin within their incoming data-path.
- Use traffic mirroring where possible, as this is expected to reduce the maintenance overhead as well as reduce the risk of network configuration errors.
- If you are not using traffic mirroring, you must explicitly add Forescout IP addresses to participating DHCP relays or network applications.

Example of DHCP Relay Configuration

Use the following commands to enable the DHCP service and define DHCP helpers on Cisco routers:

- Use the **service dhcp** command to enable DHCP relay functionality on a router.
- Use the **ip helper-address** command to specify the forwarding broadcast or host IP for DHCP traffic.

For more information on configuring external software, refer to the relevant product documentation.

Detect Hosts without Known IP Addresses

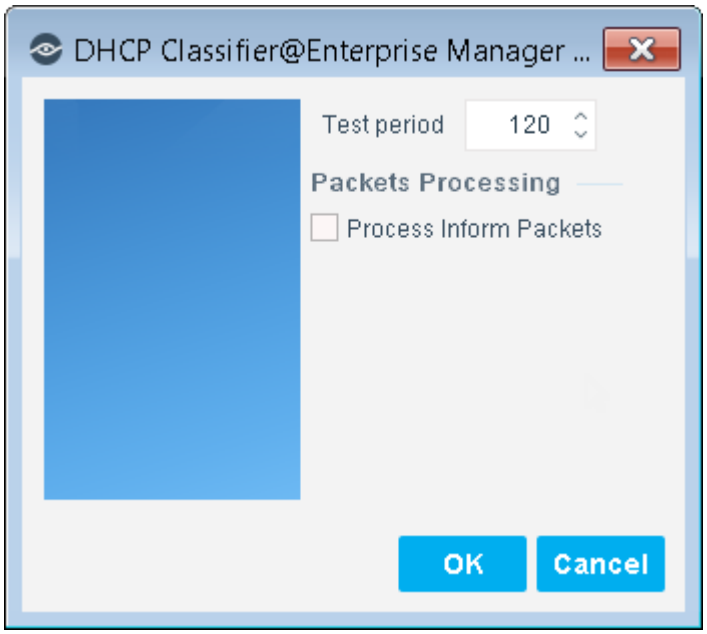
You can configure your network to detect hosts without known IP addresses, allowing you to expedite endpoint classification for endpoints that have not yet received an IP address. For details, refer to "Working with the Internal Network" in the *Forescout Administration Guide*. See Additional Forescout Documentation for information about how to access the guide.

Configure and Test the Plugin

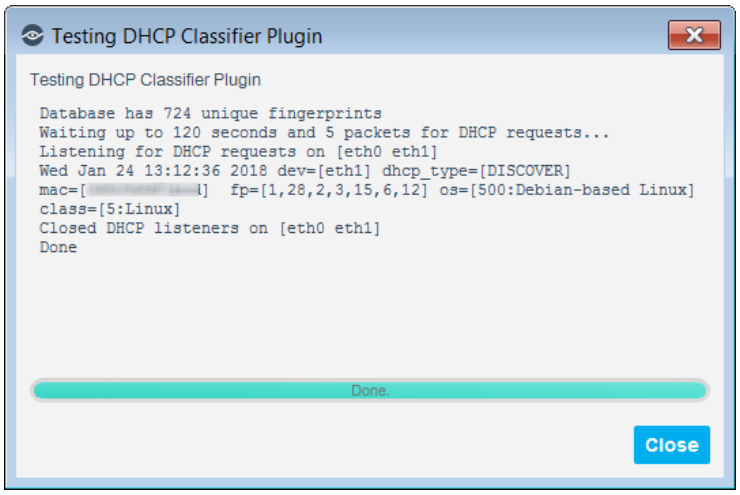
After you configure the plugin, you can test the DHCP service to verify that the plugin detects DHCP requests. You must first run the test from the plugin to listen for DHCP requests and then trigger the DHCP request from an endpoint with a known MAC address to verify that the recording of the request.

To configure and test the plugin:

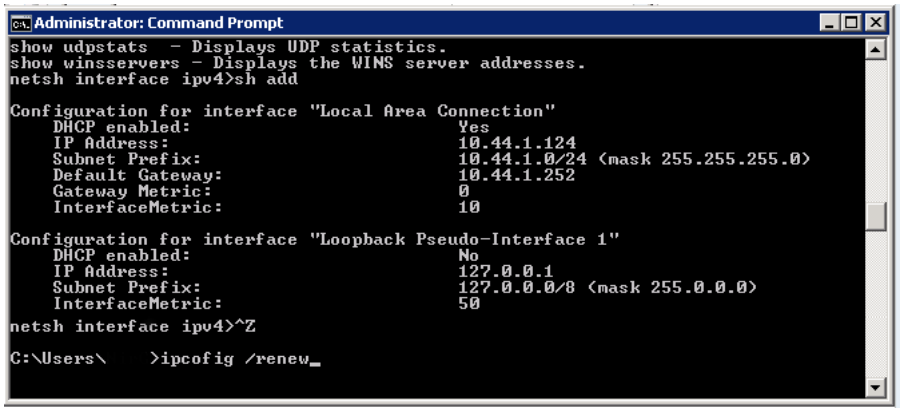
1. Select **Options** from the **Tools** menu. The Options pane opens.
2. Open the **Modules** pane and select **Core Extensions > DHCP Classifier**.
3. If the plugin is not running, select the **Start** button.
4. (Optional) Select **Configure**. Select the relevant appliances and select **OK**. The following configuration options are available:
   - Change the test period. The value is in seconds. The value you define should allow you to trigger the DHCP request and allow Forescout eyeSight to detect the triggered DHCP request (see step 6 below). If the test period is too long, eyeSight may collect unrelated information (see step 7 below). Typically test interval setting is a onetime process retained within the plugin configuration.
   - Select the **Process Inform Packets** option if you want the plugin to parse DHCP INFORM messages.



5. Select the **Test** button. A confirmation popup opens. For the duration of the test (as configured in step 4), the plugin listens for DHCP requests on the device.



6. Trigger the DHCP request from an endpoint with a known MAC address within the managed network segment.



7. Verify that eyeSight recorded the DHCP request with the specified MAC address from the tested endpoint. If eyeSight did not detect the request, verify port mirroring or recheck the configuration of the DHCP relay and server.
8. Select **Close**. If necessary, restart the test.

Use DHCP Properties in Policies

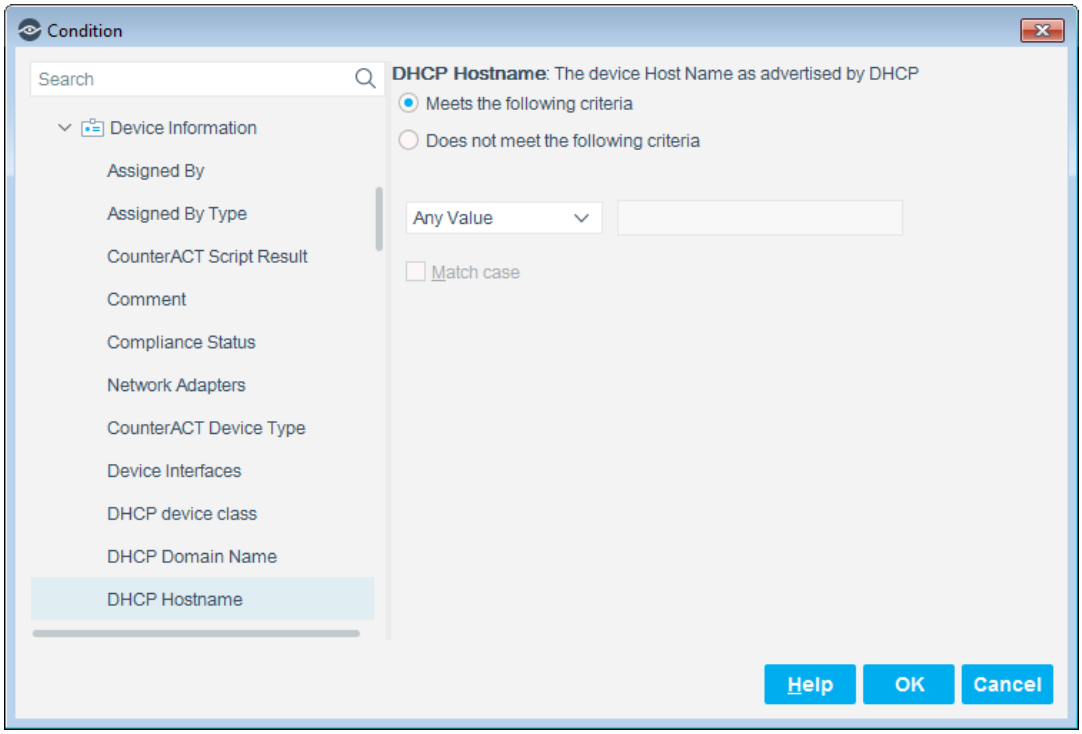
When you configure this plugin, DHCP host properties are made available for use in Forescout policies. Property values are extracted from fields of DHCP messages or are deduced from these messages by DHCP fingerprinting. DHCP host properties return basic information about the host that are made available as conditions in Forescout *Primary Classification* policies.

You can use DHCP properties in Forescout policies to classify unclassified devices. You may need to edit *Primary Classification* policies when DHCP properties report a new asset or product type not currently included in these policies. See Extend DHCP Fingerprint Values.

For more information about using properties in policies, refer to the *Forescout Administration Guide*. See Additional Forescout Documentation for information about how to access the guide.

DHCP Properties

This plugin provides the following DHCP-based host properties.



Specific DHCP properties are renamed with the appended suffix **(Obsolete)**. Existing policies that include the use of obsolete DHCP properties continue to function using these properties. However, when creating new policies, you can only use the current (non-obsolete) version of these properties.

DHCP Domain Name: The device Domain Name as advertised by DHCP.

- The property **DHCP Domain Name (Obsolete)** is not available when creating new policies.

DHCP Hostname: The hostname of the device as it appears in option tag 12 of the DHCP_DISCOVER message.

- This information may not be available for all hosts, depending upon equipment vendor, operating system, or host configuration.
- The property **DHCP Hostname (Obsolete)** is not available when creating new policies.

DHCP Vendor Class: The vendor class of the device, as it appears in option tag 60 of the DHCP_DISCOVER message.

- This information may not be available for all hosts, depending upon equipment vendor, operating system, or host configuration.
- The property **DHCP Device OS (Obsolete)** is not available when creating new policies.

DHCP Device Class: The general operating system or type of the device. The DHCP Classifier Plugin deduces this value from the DHCP fingerprint.

- The property **DHCP Device Class (Obsolete)** is not available when creating new policies.
- Valid values in this release are listed below.

To add additional device class values based on DHCP fingerprints in your network environment, see Extend DHCP Fingerprint Values.

Windows	Video Conferencing
Macintosh	BSD
VoIP Phones/Adapters	Misc
Routers and APs	Dead OSes
Linux	Network Boot Agents
Gaming Consoles	CD-Based OSes
Home Audio/Video Equipment	Solaris
Printers	Smartphones/PDAs/Tablets
Switches	Monitoring Devices
Projectors	Thin Clients
Physical Security	Datacenter appliance
Point of Sale devices	

DHCP Device OS: The specific operating system running on the device. The DHCP Classifier Plugin deduces this value from the DHCP fingerprint.

- The property **DHCP Device OS (Obsolete)** is not available when creating new policies.
- Valid values in this release are listed below:

To add additional device values based on DHCP fingerprints in your network environment, see Extend DHCP Fingerprint Values.

Android 0.9	Linux 2.4
Android 1.0	Linux 2.6
Android 1.5-2.1	Mac OS 9.1
Android 2.2	Mac OS 9.2
Android 3.0	Mac OS 9.x
BeOS 4	Mac OS X
BeOS 5	Maemo
FreeBSD	Microsoft
FreeBSD 6.0	OpenBSD 3.8
FreeBSD 6.1	OpenBSD 4
FreeBSD 6.2	OpenSolaris
FreeBSD 6.3	OS/2 Warp
FreeBSD 7	Sun 5.6
FreeBSD 7.1	VxWorks 5.4
FreeBSD 7.2	VxWorks 5.5
FreeNAS	Windows
Haiku	Windows 2000
iOS	Windows 7
IOS	Windows 95
Linux	Windows 95 B
Linux 2.0	Windows 98
Linux 2.2	Windows 98 SE
Windows CE	Windows Server 2003
Windows ME	Windows Server 2008
Windows NT 4	Windows Vista
Windows Phone	Windows XP

DHCP Request Fingerprint: The contents of the Parameter Request field (option tag 55) of the DHCP_DISCOVER message. Use this field with Forescout string matching options to create policy conditions that find specific DHCP tag values you discover in your environment.

- The property **DHCP Request Fingerprint (Obsolete)** is not available when creating new policies.

DHCP Options Fingerprint: The contents of the option declarations section of the DHCP_DISCOVER message. Use this field with Forescout string matching options to create policy conditions that find specific DHCP tag values you discover in your environment.

- The property **DHCP Options Fingerprint (Obsolete)** is not available when creating new policies.

*DHCP server properties, including the **DHCP Server Address** property, are resolved by the Forescout platform 8.1 or above and not by the DHCP Classifier plugin.*

DHCP Server Address: The device IP received from a DHCP server and used as the IP address of the DHCP server.

Extend DHCP Fingerprint Values

The DHCP Classifier Plugin identifies most commonly encountered operating systems and device types. However, you may discover values in DHCP message fields that are common, useful markers in your environment – yet are not included in the valid values provided by the plugin.

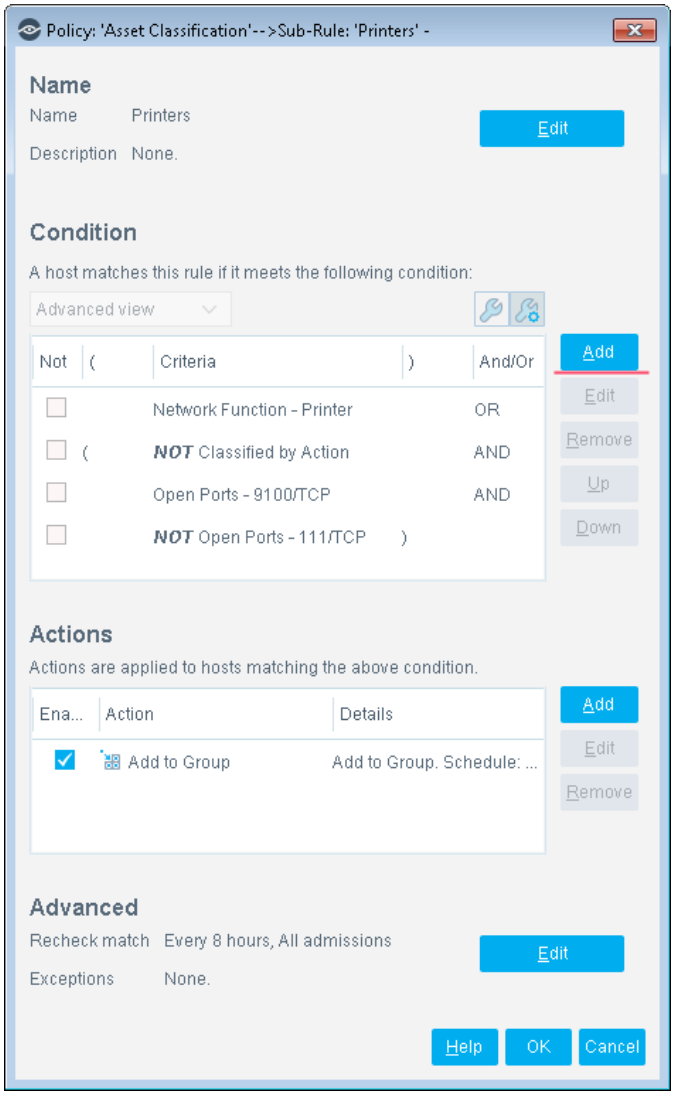
Use string matching conditions to identify and use these values in Forescout policies. The ***DHCP request fingerprint*** property and the ***DHCP options fingerprint*** property let you match any pattern of values in these sections of the DHCP_Request message. In effect, you use these properties to define a DHCP fingerprint for a device that is not identified by the plugin.

For example, follow this procedure if Forescout eyeSight does not automatically categorize a printer or other device or they are unmanaged.

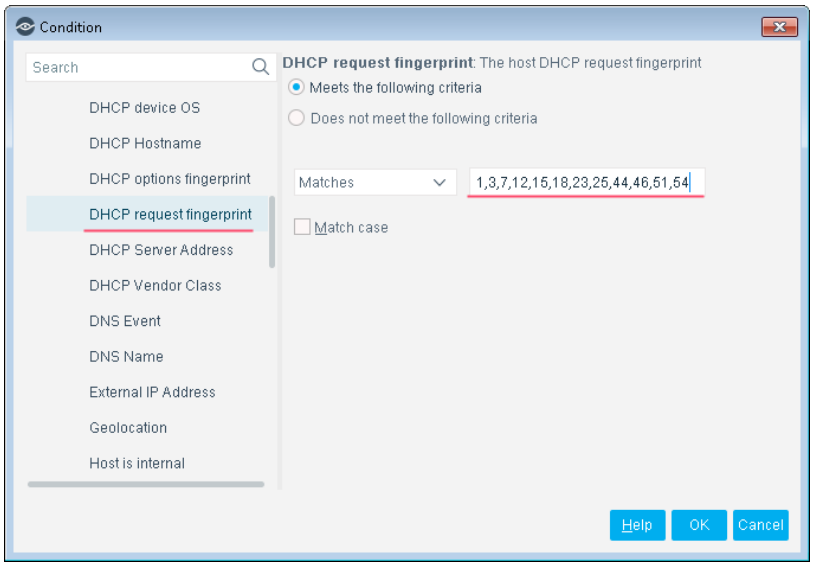
1. Capture the DHCP_Request Message of the device.
2. Identify a unique fingerprint of values in the Parameter Request or Options sections of the DHCP_Request message. For example, the Options section of the message may contain the following unique pattern of option flags: **6,3,1,67,15**
3. Edit a relevant *Primary Classification* policy. Define a string matching condition that classifies the device when the unique fingerprint pattern is found in the ***DHCP request fingerprint*** property or the ***DHCP options fingerprint*** property.

To classify this device based on its DHCP fingerprint:

1. Edit the relevant *Primary Classification* template. Add a new condition to the *Printers* sub-rule.



2. The new condition matches the DHCP request fingerprint of the printer.



All devices with this DHCP request fingerprint are classified as printers.

Core Extensions Module Information

The DHCP Classifier Plugin is installed with the Forescout Core Extensions Module.

The Forescout Core Extensions Module provides an extensive range of capabilities that enhance the core Forescout solution. These capabilities enhance detection, classification, reporting, troubleshooting, and more. The following components are installed with the Core Extensions Module:

Advanced Tools Plugin	Device Data Publisher	IoT Posture Assessment Engine
CEF Plugin	DNS Client Plugin	
Cloud Uploader	DNS Enforce Plugin	NBT Scanner Plugin
DHCP Classifier Plugin	DNS Query Extension Plugin	Packet Engine
Dashboards Plugin	External Classifier Plugin	Reports Plugin
Data Publisher	Flow Analyzer Plugin	Syslog Plugin
Data Receiver	Flow Collector	Technical Support Plugin
Device Classification Engine	IOC Scanner Plugin	Web Client Plugin

The Core Extensions Module is a Forescout Base Module. Base Modules are delivered with each Forescout release. Upgrading the Forescout version or performing a clean installation installs this module automatically.

Additional Forescout Documentation

For information about other Forescout features and modules, refer to the following resources:

- Documentation Downloads
- Documentation Portal
- Forescout Help Tools

Documentation Downloads

Documentation downloads can be accessed from the Forescout Technical Documentation Page, and one of two Forescout portals, depending on which licensing mode your deployment is using.

- ***Per-Appliance Licensing Mode*** – Product Updates Portal
- ***Flexx Licensing Mode*** – Customer Support Portal

Software downloads are also available from these portals.

To identify your licensing mode:

- From the Console, select **Help > About Forescout**.

Forescout Technical Documentation Page

The Forescout Technical Documentation Page provides access to a searchable, web-based Documentation Portal as well as PDF links to the full range of technical documentation.

To access the Technical Documentation Page:

- Go to https://www.Forescout.com/company/technical-documentation/

Product Updates Portal

The Product Updates Portal provides links to Forescout version releases, Base and Content Modules, and eyeExtend products, as well as related documentation. The portal also provides a variety of additional documentation.

To access the Product Updates Portal:

- Go to https://updates.forescout.com/support/index.php?url=counteract and select the version you want to discover.

Customer Support Portal

The Downloads page on the Forescout Customer Support Portal provides links to purchased Forescout version releases, Base and Content Modules, and eyeExtend products, as well as related documentation. Software and related documentation will only appear on the Downloads page if you have a license entitlement for the software.

To access documentation on the Customer Support Portal:

- Go to https://Forescout.force.com/support/ and select **Downloads**.

Documentation Portal

The Forescout Documentation Portal is a searchable, web-based library containing information about Forescout tools, features, functionality, and integrations.

To access the Documentation Portal:

- Go to https://updates.forescout.com/support/files/counteract/docs_portal/

Forescout Help Tools

Access information directly from the Console.

Console Help Buttons

Use context sensitive *Help* buttons to quickly access information about the tasks and topics you are working with.

Forescout Administration Guide

- Select **Administration Guide** from the **Help** menu.

Plugin Help Files

- After the plugin is installed, select **Tools** > **Options** > **Modules**, select the plugin and then select **Help**.

Documentation Portal

- Select **Documentation Portal** from the **Help** menu to access the Documentation Portal.