Configuring Autoconf

The following sections provide information about Autoconf and how to configure Autoconf:

- Prerequisites for Autoconf, on page 1
- Restrictions for Autoconf, on page 1
- Information about Autoconf , on page 2
- How to Configure Autoconf, on page 7
- Configuration Examples for Autoconf, on page 16
- Additional References for Autoconf, on page 18
- Feature History for Autoconf, on page 18

Prerequisites for Autoconf

- Before enabling Autoconf, disable the Auto SmartPort (ASP) macro, device classifier, and then access the session monitor.

Restrictions for Autoconf

- ASP macro and Autoconf are not supported on the same interface at the same time. Either Autoconf or ASP must be disabled on a per-interface level.
- Interface templates are not applicable for wireless sessions.
- When the Autoconf feature is enabled using the **autoconf enable** command, the default Autoconf service policy is applied to all the interfaces. No other service policy can be applied globally using the **service-policy** command. To apply a different service policy, you must disable Autoconf on that interface. When a service policy is applied globally, you must disable it before enabling the Autoconf feature.
- When both local (interface level) and global service policies exist, the local policy takes precedence. The global service policy comes into effect only when the local policy is removed.
- Service templates cannot be applied to interfaces, and interface templates cannot be applied to service instances.
- Only one service template can be nested inside an interface template.
- Autoconf does not support the switchover feature.

Information about Autoconf

The following sections provide information about Autoconf.

Benefits of Autoconf

The Autoconf feature permits hardbinding between an end device and an interface. Autoconf falls under the umbrella of the Cisco Smart Operations solution. Smart Operations is a comprehensive set of capabilities that can simplify and improve LAN switch deployment, and help organizations deliver operational excellence and scale services on the network.

The Autoconf feature automatically applies the necessary configurations on the device ports to enable the efficient performance of each directly connected end device using a set of interface configurations that are configured inside an interface template:

- Autoconf efficiently applies commands to an interface because the parser does not need to parse each command each time.
- Configurations that are applied through the Autoconf feature can be reliably removed from a port without impacting previous or subsequent configurations on the port.
- The Autoconf feature provides built-in and user-defined configurations using interface and service templates. Configurations applied through templates can be centrally updated with a single operation.
- Using the Autoconf feature, a configuration can be applied to ports and access sessions.
- The Autoconf feature reduces ongoing maintenance for devices and attached end devices by making them intuitive and autoconfigurable. This reduces operation expenses (OPEX) and lowers the total cost of ownership (TCO).

Identity Session Management and Templates

A key advantage of the Autoconf feature is that the core session management capability is decoupled from the application-specific logic, allowing the same framework to be used regardless of the criteria for policy determination or the nature of the policies applied.

The identity session management infrastructure allows configurations or policies or both to be applied as templates.

Both service and interface templates are named as containers of configuration and policy. Service templates can be applied only to access sessions, while interface templates can be applied only to ports. When a service template is applied to an access session, the contained configuration and policy are applied only to the target session, and has no impact on other sessions that may be hosted on the same access port. Similarly, when an interface template is applied to an access port, it impacts all the traffic exchanged on the port.

The Autoconf feature uses a set of built-in maps and built-in templates. The built-in templates are designed based on best practices for interface configurations. Built-in templates can be modified by users to include customized configurations, limiting the need to create a new template.

The templates created by users are referred to as user-defined templates. These templates can be defined on a device and can be mapped to any built-in or user-defined trigger.

Use the **show derived-config** command, to view the overall applied configurations applied by Autoconf template and manual configuration. The interface commands shown in the output of the **show running-config interface** *type number* command are not necessarily the operational configuration. The Autoconf feature dynamically applies a template to the interface, and overrides any conflicting static configuration that is already applied.

Autoconf Operation

Autoconf uses the Device Classifier to identify the end devices that are connected to a port.

The Autoconf feature uses the device classification information gleaned from Cisco Discovery Protocol, LLDP, DHCP, MAC addresses, and the Organizationally Unique Identifier (OUI) that is identified by the Device Classifier.

The Device Classifier provides improved device classification capabilities and accuracy, and increased device visibility for enhanced configuration management.

Device classification is enabled when you enable the Autoconf feature using the **autoconf enable** command in global configuration mode.

The device detection acts as an event trigger, which in turn applies the appropriate automatic template to the interface.

The Autoconf feature is based on a three-tier hierarchy.

- A policy map identifies the trigger type for applying the Autoconf feature.
- A parameter map identifies the appropriate template that must be applied, based on the end device.
- The templates contain the configurations to be applied.

The Autoconf built-in templates and triggers perform the above tasks automatically.

The Autoconf feature provides the following built-in templates:

- AP_INTERFACE_TEMPLATE
- DMP_INTERFACE_TEMPLATE
- IP_CAMERA_INTERFACE_TEMPLATE
- IP_PHONE_INTERFACE_TEMPLATE
- LAP_INTERFACE_TEMPLATE
- MSP_CAMERA_INTERFACE_TEMPLATE
- MSP_VC_INTERFACE_TEMPLATE
- PRINTER_INTERFACE_TEMPLATE
- ROUTER_INTERFACE_TEMPLATE
- SWITCH_INTERFACE_TEMPLATE
- TP_INTERFACE_TEMPLATE

Note By default, built-in templates are not displayed under running configuration. The built-in templates are displayed in the running configuration only if you edit them.

The template that is selected is based on parameter map information applied to an interface. This information can be based on the following criteria:

- End Device type
- MAC address
- OUI
- Platform type
- User role
- Username

The Autoconf feature provides one built-in parameter map (BUILTIN_DEVICE_TO_TEMPLATE) with the following configuration:

```
Parameter-map name: BUILTIN_DEVICE_TO_TEMPLATE
 Map: 10 map device-type regex "Cisco-IP-Phone"
  Action(s):
   20 interface-template IP_PHONE_INTERFACE_TEMPLATE
 Map: 20 map device-type regex "Cisco-IP-Camera"
  Action(s):
   20 interface-template IP_CAMERA_INTERFACE_TEMPLATE
 Map: 30 map device-type regex "Cisco-DMP"
  Action(s):
   20 interface-template DMP_INTERFACE_TEMPLATE
 Map: 40 map oui eq "00.0f.44"
  Action(s):
   20 interface-template DMP_INTERFACE_TEMPLATE
 Map: 50 map oui eq "00.23.ac"
  Action(s):
   20 interface-template DMP_INTERFACE_TEMPLATE
 Map: 60 map device-type regex "Cisco-AIR-AP"
  Action(s):
   20 interface-template AP_INTERFACE_TEMPLATE
 Map: 70 map device-type regex "Cisco-AIR-LAP"
  Action(s):
   20 interface-template LAP_INTERFACE_TEMPLATE
 Map: 80 map device-type regex "Cisco-TelePresence"
  Action(s):
   20 interface-template TP_INTERFACE_TEMPLATE
 Map: 90 map device-type regex "Surveillance-Camera"
  Action(s):
   10 interface-template MSP_CAMERA_INTERFACE_TEMPLATE
 Map: 100 map device-type regex "Video-Conference"
  Action(s):
   10 interface-template MSP_VC_INTERFACE_TEMPLATE
```

Note Use the **show parameter-map type subscriber attribute-to-service All** command to view the configuration for the built-in parameter map.

The Autoconf feature provides one built-in policy map (BUILTIN_AUTOCONF_POLICY) with the following configuration:

```
BUILTIN_AUTOCONF_POLICY
  event identity-update match-all
    10 class always do-until-failure
      10 map attribute-to-service table BUILTIN_DEVICE_TO_TEMPLATE
```

Note Use the **show policy-map type control subscriber BUILTIN_AUTOCONF_POLICY** command to view the configuration for the built-in policy map.

You can also manually create policy maps, parameter maps, and templates.

When a trigger is created that is based on specific user information, a local 802.1X Cisco Identity Services Engine (ISE) server authenticates it, ensuring the security of the operation.

An interface template can be dynamically activated (on an interface) using any of the following methods:

- RADIUS CoA: While Change of Authorization (CoA) commands are targeted at one or more access sessions, any referenced template must be applied to the interface that is hosting the referenced session.
- RADIUS Access-Accept for client authentication or authorization: Any referenced interface template returned in an Access-Accept must be applied to the port that is hosting the authorized access session.
- Service template: If an interface template is referenced in a service template that is either locally defined or sourced from the AAA server, the interface template must be applied to the interface hosting an access-session on which the service template is applied. (Add a new command for interface template reference from within a locally defined service template.)
- Subscriber control-policy action: A mapping action under the subscriber control policy activates service or interface template (as referenced in a parameter map) or both based on the type of filter, and removes templates, if any, associated with a previous policy.
- Device-to-template parameter map: A subscriber parameter map that allows the filter type-to-service or interface template mappings or both to be specified in an efficient and readable manner.

Advantages of Using Templates

Using templates for auto configuration has the following benefits:

- Templates are parsed once when they are being defined. This makes the dynamic application of the templates very efficient.
- Templates can be applied to an Ethernet interface that is connected to an end device, based on the type of end device.
- Service templates allow the activation of session-oriented features, whereas interface templates apply configurations to the interface that is hosting a session.
- Service templates are applied to access sessions and hence only impact the traffic exchanged with a single endpoint on a port.
- Startup and running configurations of a device are not modified by the dynamic application of a template.
- Policy application is synchronized with the access-session life cycle. This is tracked by the framework by using all the available techniques, including link-up or link-down.

- Templates can be updated with a single operation. All the applied instances of templates are also updated during this operation.
- Constituent commands of templates do not appear in the running configuration.
- Templates can be removed with no impact on previous or subsequent configurations.
- Template application is acknowledged, allowing for synchronization and performance of remedial actions when failures occur.
- Data VLAN, quality of service (QoS) parameters, storm control, and MAC-based port security are configured automatically based on the end device that is connected to the switch.
- The switch port is cleaned up completely by removing configurations when the device is disconnected from a port.
- Human error is reduced in the installation and configuration process.

Autoconf Functionality

The Autoconf feature is disabled by default in global configuration mode. When you enable the Autoconf feature in global configuration mode, it is enabled by default at the interface level. The built-in template configurations are applied based on the end devices detected on all the interfaces.

Use the **access-session inherit disable autoconf** command to manually disable Autoconf at the interface level, even when Autoconf is enabled at the global level.

If you disable Autoconf at the global level, all the interface-level configurations are disabled.

Table 1: Autoconf Functionality

Global	Interface Level	AutoConf Status
Disable	Disable	No automatic configurations are applied when an end device is connected.
Enable	Enable	If Autoconf is enabled at the global level, it is also enabled at the interface level by default. Built-in template configurations are applied based on the end devices that are detected on all the interfaces.
Enable	Disable	Enabled at global level. Disabled at interface level. No automatic configurations are applied when an end device is connected to the interface on which Autoconf is disabled.

Autoconf allows you to retain the template even when the link to the end device is down or the end device is disconnected, by configuring the autoconf sticky feature **access-session interface-template sticky** command in global configuration mode. The Autoconf sticky feature avoids the need for detecting the end device and applying the template every time the link flaps or the device is removed and connected back.

The **access-session interface-template sticky** command is mandatory to apply an inbuilt template that contains **access-session** commands on an interface. Configure the **access-session interface-template sticky** command to apply interface template on a port using a service policy.

To disable the Autoconf feature on a specific interface, use the **access-session inherit disable interface-template-sticky** command in interface configuration mode.

How to Configure Autoconf

The following sections provide information about how to configure Autoconf.

Applying a Built-In Template to an End Device

The following task shows how to apply a built-in template on an interface that is connected to an end device, for example, a Cisco IP phone.

Before you begin

Make sure that the end device, for example, a Cisco IP phone, is connected to a switch port.

Procedure

	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(config)# configure terminal`	Enters global configuration mode.
Step 3	**autoconf enable** **Example:** `Device(config)# autoconf enable`	Enables the Autoconf feature.
Step 4	**end** **Example:** `Device(config)# end`	Exits global configuration mode and enters privileged EXEC mode.
Step 5	**show device classifier attached interface** *interface-type interface-number* **Example:** `Device# show device classifier attached interface Gi3/0/26`	(Optional) Displays whether the end device is classified by the device classifier with correct attributes.
Step 6	**show template binding target** *interface-type interface-number* **Example:** `Device# show template binding target gi3/0/26`	Displays the configuration applied through the template on the interface.

Example

The following example shows that an IP phone is classified by the device classifier with correct attributes:

```
Device# show device classifier attached interface GigabitEthernet 3/0/26

Summary:

MAC_Address       Port_Id       Profile Name                        Device Name
==============    ==========    ==================                  ==================
0026.0bd9.7bbb    Gi3/0/26      Cisco-IP-Phone-7962                 Cisco IP Phone 7962
```

The following example shows that a built-in interface template is applied on an interface:

```
Device# show template binding target GigabitEthernet 3/0/26

Interface Templates
===================
Interface: Gi4/0/11
Method              Source            Template-Name
------              ------            -------------
dynamic             Built-in          IP_PHONE_INTERFACE_TEMPLATE
```

The following example shows how to verify the interface configuration after the interface template is applied to an IP phone connected to the GigabitEthernet interface 3/0/26:

```
Device# show running-config interface GigabitEthernet 3/0/26
Building configuration...

Current configuration : 624 bytes
!
interface GigabitEthernet3/0/26
!
End

Device# show derived-config interface GigabitEthernet 3/0/26

Building configuration...

Derived configuration : 649 bytes
!
interface GigabitEthernet3/0/26
 switchport mode access
 switchport block unicast
 switchport port-security maximum 3
 switchport port-security maximum 2 vlan access
 switchport port-security violation restrict
 switchport port-security aging time 2
 switchport port-security aging type inactivity
 switchport port-security
 load-interval 30
 storm-control broadcast level pps 1k
 storm-control multicast level pps 2k
 storm-control action trap
 spanning-tree portfast
 spanning-tree bpduguard enable
 service-policy input AutoConf-4.0-CiscoPhone-Input-Policy
 service-policy output AutoConf-4.0-Output-Policy
 ip dhcp snooping limit rate 15
```

```
end
```

The following example shows how to verify the global configuration after configuring Autoconf:

```
Device# show running config
class-map match-any AutoConf-4.0-Scavenger-Queue
 match dscp cs1
 match cos  1
 match access-group name AutoConf-4.0-ACL-Scavenger
class-map match-any AutoConf-4.0-VoIP
 match dscp ef
 match cos  5
class-map match-any AutoConf-4.0-Control-Mgmt-Queue
 match cos  3
 match dscp cs7
 match dscp cs6
 match dscp cs3
 match dscp cs2
 match access-group name AutoConf-4.0-ACL-Signaling
class-map match-any AutoConf-4.0-Multimedia-Conf
 match dscp af41
 match dscp af42
 match dscp af43
class-map match-all AutoConf-4.0-Broadcast-Vid
 match dscp cs5
class-map match-any AutoConf-4.0-Bulk-Data
 match dscp af11
 match dscp af12
 match dscp af13
class-map match-all AutoConf-4.0-Realtime-Interact
 match dscp cs4
class-map match-any AutoConf-4.0-VoIP-Signal
 match dscp cs3
 match cos  3
class-map match-any AutoConf-4.0-Trans-Data-Queue
 match cos  2
 match dscp af21
 match dscp af22
 match dscp af23
 match access-group name AutoConf-4.0-ACL-Transactional-Data
class-map match-any AutoConf-4.0-VoIP-Data
 match dscp ef
 match cos  5
class-map match-any AutoConf-4.0-Multimedia-Stream
 match dscp af31
 match dscp af32
 match dscp af33
class-map match-all AutoConf-4.0-Internetwork-Ctrl
 match dscp cs6
class-map match-all AutoConf-4.0-VoIP-Signal-Cos
 match cos  3
class-map match-any AutoConf-4.0-Multimedia-Stream-Queue
 match dscp af31
 match dscp af32
 match dscp af33
class-map match-all AutoConf-4.0-Network-Mgmt
 match dscp cs2
class-map match-all AutoConf-4.0-VoIP-Data-Cos
 match cos  5
class-map match-any AutoConf-4.0-Priority-Queue
 match cos  5
 match dscp ef
 match dscp cs5
 match dscp cs4
```

```
class-map match-any AutoConf-4.0-Bulk-Data-Queue
 match cos  1
 match dscp af11
 match dscp af12
 match dscp af13
 match access-group name AutoConf-4.0-ACL-Bulk-Data
class-map match-any AutoConf-4.0-Transaction-Data
 match dscp af21
 match dscp af22
 match dscp af23
class-map match-any AutoConf-4.0-Multimedia-Conf-Queue
 match cos  4
 match dscp af41
 match dscp af42
 match dscp af43
 match access-group name AutoConf-4.0-ACL-Multimedia-Conf
class-map match-all AutoConf-4.0-Network-Ctrl
 match dscp cs7
class-map match-all AutoConf-4.0-Scavenger
 match dscp cs1
class-map match-any AutoConf-4.0-Signaling
 match dscp cs3
 match cos  3
!
!
policy-map AutoConf-4.0-Cisco-Phone-Input-Policy
 class AutoConf-4.0-VoIP-Data-Cos
  set dscp ef
  police cir 128000 bc 8000
   exceed-action set-dscp-transmit cs1
   exceed-action set-cos-transmit 1
 class AutoConf-4.0-VoIP-Signal-Cos
  set dscp cs3
  police cir 32000 bc 8000
   exceed-action set-dscp-transmit cs1
   exceed-action set-cos-transmit 1
 class class-default
  set dscp default
  set cos 0
policy-map AutoConf-4.0-Output-Policy
 class AutoConf-4.0-Scavenger-Queue
  bandwidth remaining percent 1
 class AutoConf-4.0-Priority-Queue
  priority
  police cir percent 30 bc 33 ms
 class AutoConf-4.0-Control-Mgmt-Queue
  bandwidth remaining percent 10
 class AutoConf-4.0-Multimedia-Conf-Queue
  bandwidth remaining percent 10
 class AutoConf-4.0-Multimedia-Stream-Queue
  bandwidth remaining percent 10
 class AutoConf-4.0-Trans-Data-Queue
  bandwidth remaining percent 10
    dbl
 class AutoConf-4.0-Bulk-Data-Queue
  bandwidth remaining percent 4
    dbl
 class class-default
  bandwidth remaining percent 25
    dbl
policy-map AutoConf-DMP
 class class-default
  set dscp cs2
policy-map AutoConf-IPVSC
```

```
 class class-default
  set cos dscp table AutoConf-DscpToCos
policy-map AutoConf-4.0-Input-Policy
 class AutoConf-4.0-VoIP
 class AutoConf-4.0-Broadcast-Vid
 class AutoConf-4.0-Realtime-Interact
 class AutoConf-4.0-Network-Ctrl
 class AutoConf-4.0-Internetwork-Ctrl
 class AutoConf-4.0-Signaling
 class AutoConf-4.0-Network-Mgmt
 class AutoConf-4.0-Multimedia-Conf
 class AutoConf-4.0-Multimedia-Stream
 class AutoConf-4.0-Transaction-Data
 class AutoConf-4.0-Bulk-Data
 class AutoConf-4.0-Scavenger
```

Applying a Modified Built-In Template to an End Device

The following task shows how to modify a built-in template when multiple wireless access points and IP cameras are connected to a switch:

Procedure

	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(config)# configure terminal`	Enters global configuration mode.
Step 3	**template** *template-name* **Example:** `Device(config)# template AP_INTERFACE_TEMPLATE`	Enters template configuration mode for the built-in template.
Step 4	**switchport access vlan** *vlan-id* **Example:** `Device(config-template)# switchport access vlan 20`	Sets the VLAN when the interface is in access mode.
Step 5	**description** *description* **Example:** `Device(config-template)# description modifiedAP`	Modifies the description of the built-in template.
Step 6	**exit** **Example:**	Exits template configuration mode and enters global configuration mode.

	Command or Action	Purpose
	`Device(config-template)# exit`	
Step 7	**autoconf enable** **Example:** `Device(config)# autoconf enable`	Enables the Autoconf feature.
Step 8	**end** **Example:** `Device(config)# end`	Exits global configuration mode and enters privileged EXEC mode.
Step 9	**show template interface binding all** **Example:** `Device# show template interface binding all`	Displays whether the template is applied on the interface.

Example

The following example shows that an IP camera and access points are classified by the device classifier with correct attributes:

```
Device# show device classifier attached detail

DC default profile file version supported = 1

Detail:
MAC_Address     Port_Id    Cert Parent Proto    ProfileType     Profile Name
Device_Name
=============================================================================================================
001d.a1ef.23a8  Gi1/0/7     30    3    C     M    Default      Cisco-AIR-AP-1130      cisco
 AIR-AP1131AG-A-K9
001e.7a26.eb05  Gi1/0/30    70    2    C     M    Default      Cisco-IP-Camera        Cisco
 IP Camera
```

The following example shows that the built-in interface template is applied on an interface:

```
Device# show template interface binding all

Template-Name                   Source            Method          Interface
-------------                   ------            ------          ---------
IP_CAMERA_INTERFACE_TEMPLATE     Built-in          dynamic         Gi1/0/30
AP_INTERFACE_TEMPLATE          Modified-Built-in   dynamic         Gi1/0/7
```

Migrating from ASP to Autoconf

Before you begin

Verify that the AutoSmart Port (ASP) macro is running by using the **show running-config | include macro auto global** command.

Procedure

	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	**no macro auto global processing** **Example:** `Device(config)# no macro auto global processing`	Disables ASP on a global level.
Step 4	**exit** **Example:** `Device(config)# exit`	Exits global configuration mode and returns to privileged EXEC mode.
Step 5	**clear macro auto configuration all** **Example:** `Device# clear macro auto configuration all`	Clears macro configurations for all interfaces.
Step 6	**configure terminal** **Example:** `Device# configure terminal`	Enters global configuration mode.
Step 7	**autoconf enable** **Example:** `Device(config)# autoconf enable`	Enables the Autoconf feature.
Step 8	**end** **Example:** `Device(config)# end`	Exits global configuration mode and returns to privileged EXEC mode.

Configuring a Platform Type Filter

The following tasks shows how to configure a platform type filter for class maps and parameter maps.

Configuring a Platform Type Filter for a Class Map

A control class defines the conditions under which the actions of a control policy are executed. You should define whether all, any, or none of the conditions must be evaluated to execute the actions of the control policy. Platform types are evaluated based on the specified platform name in the control policy.

Procedure

	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	**class-map type control subscriber** {**match-all** | **match-any** | **match-none**} *control-class-name* **Example:** `Device(config)# class-map type control subscriber match-all DOT1X_NO_AGENT`	Creates a control class and enters control class-map filter mode. • **match-all**: Must match all the conditions in the control class. • **match-any**: Must match at least one condition in the control class. • **match-none**: Must not match any of the conditions in the control class.
Step 4	**match platform-type** *platform-name* **Example:** `Device(config-filter-control-classmap)# match platform-type C3850`	Creates a condition to evaluate control classes based on the specified platform type.
Step 5	**end** **Example:** `Device(config-filter-control-classmap)# end`	Exits control class-map filter mode and returns to privileged EXEC mode.
Step 6	**show class-map type control subscriber** {**all** | **name** *control-class-name*} **Example:** `Device# show class-map type control subscriber all`	(Optional) Displays information about control policies for all the class maps or a specific class map.

Configuring a Platform Type Filter for a Parameter Map

We recommend that you use the parameter map.

Procedure

	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	**parameter-map type subscriber attribute-to-service** *parameter-map-name* **Example:** `Device(config)# parameter-map type subscriber attribute-to-service Aironet-Policy-para`	Specifies the parameter map type and name, and enters parameter-map filter mode.
Step 4	*map-index* **map platform-type** {{**eq** | **not-eq** | **regex**} *filter-name*} **Example:** `Device(config-parameter-map-filter)# 10 map platform-type eq C9xxx`	Specifies the parameter map attribute filter criteria to the platform type.
Step 5	**end** **Example:** `Device(config-parameter-map-filter-submode)# end`	Exits parameter-map filter mode and returns to privileged EXEC mode.
Step 6	**show parameter-map type subscriber attribute-to-service**{**all | name** *parameter-map-name*} **Example:** `Device# show parameter-map type subscriber attribute-to-service`	(Optional) Displays the parameter map attributes.

Configuring a Device Type Filter for a Class Map

A control class defines the conditions under which the actions of a control policy are executed. You should define whether all, any, or none of the conditions must be evaluated to execute the actions of the control policy. Device types are evaluated based on the specified device name in the control policy.

Procedure

	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	**class-map type control subscriber** {**match-all** | **match-any** | **match-none**} *control-class-name* **Example:** `Device(config)# class-map type control subscriber match-all Device-Type-Match`	Creates a control class and enters control class-map filter mode. • **match-all**: Must match all the conditions in the control class. • **match-any**: Must match at least one condition in the control class. • **match-none**: Must not match any of the conditions in the control class.

Step 4	**match device-type** {*device-name*|**regex** *regular-expression*}
	Example:
	`Device(config-filter-control-classmap)# match device-type laptop`
	`Device(config-filter-control-classmap)# match device-type regex cis*`
		Creates a condition to evaluate control classes based on the specified device type.
		• *device-name*: Enter a device name for the class map attribute filter criteria.
		• **regex** *regular-expression*: Enter a regular expression to specify the filter type.

Step 5	**end** **Example:** `Device(config-filter-control-classmap)# end`	Exits control class-map filter mode and returns to privileged EXEC mode.
Step 6	**show class-map type control subscriber** {**all** | **name** *control-class-name*} **Example:** `Device# show class-map type control subscriber all`	(Optional) Displays information about control policies for all the class maps or a specific class map.

Configuration Examples for Autoconf

The following sections provide configuration examples for the Autoconf feature.

Example: Applying a Built-In Template to an End Device

The following example shows how to apply a built-in template to an end device connected to an interface:

```
Device> enable
Device(config)# configure terminal
Device(config)# autoconf enable
Device(config)# end
Device# show device classifier attached interface Gi3/0/26
Device# show template binding target GigabitEthernet 3/0/26
```

Example: Applying a Modified Built-In Template to an End Device

The following example shows how to apply a modified built-in template to an end device and verify the configuration:

```
Device> enable
Device(config)# configure terminal
Device(config)# template AP_INTERFACE_TEMPLATE
Device(config-template)# switchport access vlan 20
Device(config-template)# description modifiedAP
Device(config-template)# exit
Device(config)# autoconf enable
Device(config)# end
Device# show template interface binding all
```

Example: Migrating from ASP Macros to Autoconf

The following example shows how to migrate from ASP to Autoconf:

```
Device> enable
Device# configure terminal
Device(config)# no macro auto global processing
Device(config)# exit
Device# clear macro auto configuration all
Device# configure terminal
Device(config)# autoconf enable
Device(config)# end
```

Example: Configuring a Platform Type Filter

The following example shows how to configure a platform type filter for a class map:

```
Device> enable
Device# configure terminal
Device(config)# class-map type control subscriber match-all DOT1X_NO_AGENT
Device(config-filter-control-classmap)# match platform-type C9xxx
Device(config-filter-control-classmap)# end
Device#
```

The following example shows how to configure a platform type filter for a parameter map:

```
Device> enable
Device# configure terminal
```

```
Device(config)# parameter-map type subscriber attribute-to-service Aironet-Policy-para
Device(config-parameter-map-filter)# 10 map platform-type eq C9xxx
Device(config-parameter-map-filter-submode)# end
Device#
```

Additional References for Autoconf

Related Documents

Related Topic	Document Title
Cisco identity-based networking services commands	Cisco IOS Identity-Based Networking Services Command Reference
Interface Templates	"Interface Templates" chapter in Identity-Based Networking Services Configuration Guide.

Standards and RFCs

Standard/RFC	Title
IEEE 802.1X	*Port Based Network Access Control*

Feature History for Autoconf

This table provides release and related information for the features explained in this module.

These features are available in all the releases subsequent to the one they were introduced in, unless notedotherwise.

Release	Feature	Feature Information
Cisco IOS XE Everest 16.6.1	Autoconf	The Autoconf feature permits hardbinding between an end device and an interface. In Autoconf the core session management capability is decoupled from the application-specific logic, allowing the same framework to be used regardless of the criteria for policy determination or the nature of the policies applied.
Cisco IOS XE Gibraltar 16.12.1	AutoConf Device Granularity to PID of Cisco Switch	The **platform type** filter option was introduced for class map and parameter map configurations.

Release	Feature	Feature Information
Cisco IOS XE Cupertino 17.7.1	Autoconf	This feature was implemented on supervisor modules C9400X-SUP-2 and C9400X-SUP-2XL, which were introduced in this release.

Use the Cisco Feature Navigator to find information about platform and software image support. To access Cisco Feature Navigator, go to https://cfnng.cisco.com/.