



## **Auto Smartports Configuration Guide**

Cisco IOS Release 12.2(55)SE  
December 2010

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*Auto Smartports Configuration Guide*

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## Preface

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If your switch is stacking-capable (for example, a Catalyst 3750-X, 3750-E, or 2960-S switch), unless otherwise noted, the term *switch* refers to a standalone switch and to a switch stack.

This document describes how to configure Auto and static Smartports macros in your network. It does not describe how to install your switch. For information, see the hardware installation guide for your switch.

- Catalyst 3750-X and 3560-X switches
- Catalyst 3750-E and 3560-E switches
- Catalyst 3750, 3560, 2975, 2960-S, and 2960 switches
- Catalyst 2918 switches

For information about the Cisco IOS commands, see the Cisco IOS documentation set on Cisco.com.

This guide does not describe how to use the embedded device manager GUIs or Cisco Network Assistant (hereafter referred to as *Network Assistant*). For information about the device manager, see the switch online help. For information about Network Assistant, see *Getting Started with Cisco Network Assistant* on Cisco.com.

## Conventions

This publication uses these conventions to convey instructions and information:

For command descriptions

- Commands and keywords are in **boldface** text.
- Arguments for which you supply values are in *italic*.
- Square brackets ([ ]) mean optional elements.
- Braces ({ }) group required choices, and vertical bars (|) separate the alternative elements.
- Braces and vertical bars within square brackets ({ | }) mean a required choice within an optional element.

For interactive examples

- Terminal sessions and system displays are in `screen font`.
- Information that you enter is in **boldface screen font**.
- Nonprinting characters, such as passwords or tabs, are in angle brackets (< >).

Notes, cautions, and warnings use these conventions and symbols:

**Note**

---

Means *reader take note*. Notes contain helpful suggestions or references to materials not contained in this manual.

---

**Caution**

---

Means *reader be careful*. In this situation, you might do something that could result in equipment damage or loss of data.

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## Related Publications

For information about Cisco network devices running Auto Smartports, see the switch-specific documentation on Cisco.com:

<http://www.cisco.com/cisco/web/support/index.html>.

**Note**

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Before installing, configuring, or upgrading the switch, router, or other Cisco device, see these documents:

- For initial configuration information, see the “Using Express Setup” section in the getting started guide or the “Configuring the Switch with the CLI-Based Setup Program” appendix in the hardware installation guide.
  - For device manager requirements, see the “System Requirements” section in the release notes.
  - For Network Assistant requirements, see the *Getting Started with Cisco Network Assistant*.
  - For cluster requirements, see the *Release Notes for Cisco Network Assistant*.
  - For upgrading information, see the “Downloading Software” section in the release notes.
- 

## Obtaining Documentation, Support, and Security Guidelines

For information on obtaining documentation, submitting a service request, and gathering additional information, see the monthly *What’s New in Cisco Product Documentation*, which also lists all new and revised Cisco technical documentation:

<http://www.cisco.com/en/US/docs/general/whatsnew/whatsnew.html>

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# CHAPTER 1

## Auto Smartports and Static Smartports Macros

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### Auto Smartports Macros

Auto Smartports macros dynamically configure ports based on the device type detected on the port. When the switch detects a new device on a port, it applies the appropriate macro on the port. When there is a link-down event on the port, the switch removes the macro. For example, when you connect a Cisco IP phone to a port, Auto Smartports automatically applies the IP phone macro. The IP phone macro enables quality of service (QoS), security features, and a dedicated voice VLAN to ensure proper treatment of delay-sensitive voice traffic. Auto Smartports uses event triggers to map devices to port macros.

You can also manually configure and apply global macros.

The macros embedded in the switch software are groups of command-line interface (CLI) commands.

You can also create user-defined macros by using the Cisco IOS Shell scripting capability, which is a BASH-like language syntax for command automation and variable replacement.

For information, see [Chapter 2, “Configuring Auto Smartports and Static Smartports Macros.”](#)

### Static Smartports Macros

Static Smartports macros provide port configurations that you manually apply based on the device connected to the port. When you apply a static macro, the macro CLI commands are added to the existing port configuration. When there is a link-down event on the port, the switch does not remove the static macro configuration.

## Event Triggers

Auto Smartports uses event triggers to map macros to the source port of the event. The most common triggers are based on Cisco Discovery Protocol (CDP) messages received from a connected device. A CDP event trigger occurs when these devices are detected:

- Cisco switch
- Cisco router
- Cisco IP Phone
- Cisco Wireless Access Point including autonomous and lightweight access points
- Cisco IP video surveillance camera

Additional event triggers for Cisco and third-party devices are user-defined MAC address groups, MAC authentication bypass (MAB) messages, IEEE 802.1x authentication messages, and Link Layer Discovery Protocol (LLDP) messages.

LLDP supports a set of attributes used to discover neighbor devices. These type, length, and value attributes and descriptions are referred to as TLVs. LLDP-supported devices use TLVs to receive and send information. This protocol advertises details such as device configuration information, capabilities, and identity. Auto Smartports uses the LLDP *system capabilities* TLV as the event trigger. Use the event trigger control feature to specify if the switch applies a macro based on the detection method, device type, or configured trigger.

For more information about configuring the LLDP system capabilities TLV attributes for Auto Smartports, see the “Configuring LLDP, LLDP-MED, and Wired Location Service” chapter in the switch-specific software configuration guides.

For devices that do not support CDP, MAB, or 802.1x authentication, such as network printers, LLDP, or legacy Cisco Digital Media Players, you can configure a MAC address group with a MAC operationally unique identifier (OUI)-based trigger. You map the MAC address to a built-in or user-defined macro that has the desired configuration.

## User-Defined Files

You can designate a remote server location for user-defined macro files. You can then update and maintain one set of macro files for use by multiple switches across the network.

## Macro Persistence

The macro persistence feature causes macro configurations to remain enabled on the switch ports regardless of a link-down event. This eliminates multiple system log and configuration change notifications when the switch has link-up and link-down events or is a domain member or an end point in an EnergyWise network.

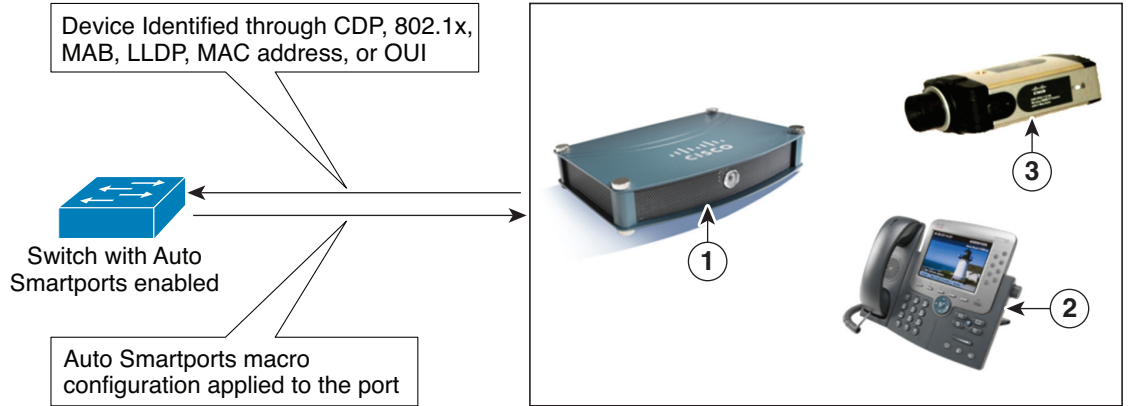
## Auto Smartports and Cisco Medianet

Cisco Medianet enables intelligent services in the network infrastructure for a variety of video applications. A service of Medianet is autoprovisioning for Cisco Digital Media Players and Cisco IP video surveillance cameras through Auto Smartports. The switch identifies Cisco and third-party video



devices by using CDP, 802.1x, MAB, LLDP, and MAC addresses (Figure 1-1). The switch applies the applicable macro to enable the appropriate VLAN, standard quality of service (QoS), and auto-QoS settings for the device. The switch also uses a built-in MAC address group to detect the legacy Cisco digital media player (DMP), based on an OUI of of4400 or 23ac00. You can also create custom user-defined macros for any video device.

**Figure 1-1 Cisco Medianet Deployment Example**



<b>1</b>	Wireless access point	<b>3</b>	Cisco IP video surveillance camera
<b>2</b>	Cisco IP phone		

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## CHAPTER 2

# Configuring Auto Smartports and Static Smartports Macros

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## Configuring Macros

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## Auto Smartports Configuration Guidelines

- You cannot delete or change the built-in macros. However, you can override a built-in macro by creating a user-defined macro with the same name. To restore the original built-in macro, delete the user-defined macro.
- If you enable both the **macro auto device** and the **macro auto execute** global configuration commands, the parameters specified in the command last executed are applied to the switch. Only one command is active on the switch.

- To avoid system conflicts when macros are applied, remove all port configurations except for 802.1x authentication.
- Do not configure port security when you enable device-specific Auto Smartports on the switch. The switch applies the appropriate port-based commands.
- If the macro conflicts with the original configuration, either the macro does not apply some of the original configuration commands, or the antimacro does not remove them. (The antimacro is the portion of the applied macro that removes the macro at a link-down event.)

For example, if 802.1x authentication is enabled, you cannot remove the **switchport-mode access** configuration. Remove the 802.1x authentication before removing the **switchport mode** configuration.

- The built-in-macro default data VLAN is VLAN 1. The built-in macro default voice VLAN is VLAN 2. (VLAN 1 is the default data VLAN for all macros. VLAN 2 is the default voice VLAN for all macros.) If your switch uses different access, native, or voice VLANs, use the **macro auto device** or the **macro auto execute** global configuration commands to configure the values.
- If you use the VLAN name in a macro, it must be the same name that is in the VLAN database for all switches in the VLAN Trunking Protocol (VTP) domain.
- Use the **show macro auto device** privileged EXEC command to display the default macros with the default parameter values, current values, and the configurable parameter list for each macro. You can also use the **show shell functions** privileged EXEC command to see the built-in-macro default values.
- To use 802.1x authentication or MAC authentication bypass (MAB) to detect non-Cisco devices, configure the RADIUS server to support the Cisco attribute-value pair **auto-smart-port=event trigger**.
- For stationary devices that do not support CDP, MAB, or 802.1x authentication, such as network printers, you can configure a MAC address group with a MAC OUI-based trigger and map it to a user-defined macro with the desired configuration.
- An 802.1x-authentication-based trigger takes precedence over all other event triggers, such as Cisco Discovery Protocol (CDP) messages, Link Layer Discovery Protocol (LLDP) messages, or user-defined MAC address groups.
- The switch supports Auto Smartport macros only on directly connected devices. Multiple device connections, such as hubs, are not supported. If multiple devices are connected, the applied macro is associated with the first detected device.
- If authentication is enabled on a port, the switch ignores a MAC address trigger if authentication fails, and there is no fallback for MAC address trigger support.
- The order of CLI commands within the macro and the corresponding antimacro can be different.
- Lightweight access point in Remote Edge Access Point (REAP) or Hybrid Remote Edge Access Point (HREAP) modes are not supported by Auto Smartports.

## Enabling Auto Smartports Macros

Follow this required procedure to enable macros globally on the switch.

Beginning in privileged EXEC mode:

	Command	Purpose
Step 1	<b>configure terminal</b>	Enters global configuration mode.
Step 2	<b>macro auto global processing</b>	Globally enables macros on the switch.
Step 3	<b>end</b>	Returns to privileged EXEC mode.
Step 4	<b>show running-config</b>	Verifies that Auto Smartports is enabled.
Step 5	<b>copy running-config startup-config</b>	(Optional) Saves your entries in the configuration file.

To return to the default setting, use the **no macro auto global processing** global configuration command.

To disable macros on a specific port, use the **no macro auto processing** interface configuration command.

You can use the **show macro auto device**, the **show shell functions**, and the **show shell triggers** privileged EXEC commands to display the event triggers and the built-in macros.

This example shows how to enable macros on the switch and then how to disable macros on a specific interface:

```
Switch(config)# macro auto global processing
Switch(config)# interface interface_id
Switch(config-if)# no macro auto processing
```

## Default Auto Smartports Configuration

- Auto Smartports is globally disabled and is enabled per interface.
- CDP fallback is globally disabled and is enabled per interface.
- Macro persistence is globally disabled and per interface.
- Cisco IOS shell is enabled.
- The switch uses these built-in macros (the defaults) when Auto Smartports is enabled for the specific devices.

**Table 2-1** Device-Specific Built-In Macros

Macro Name	Description
CISCO_AP_AUTO_SMARTPORT	This macro applies the wireless access point macro for Cisco access points. It enables standard QoS, auto-QoS, and 802.1q encapsulated trunking. It also configures the native VLAN on the interface.
CISCO_DMP_AUTO_SMARTPORT	This macro applies the digital media player macro for Cisco digital media players. It enables QoS trust, auto-QoS, port security, and spanning-tree protection. It configures the access VLAN for the interface and provides network protection from unknown unicast packets.
CISCO_IPVSC_AUTO_SMARTPORT	This macro applies the IP camera macro for Cisco IP video surveillance cameras. It enables QoS trust, auto-QoS, port security, and spanning-tree protection. It configures the access VLAN for the interface and provides network protection from unknown unicast packets.

**Table 2-1** *Device-Specific Built-In Macros (continued)*

Macro Name	Description
CISCO_LWAP_AUTO_SMARTPORT	This macro applies the lightweight wireless access point macro for Cisco lightweight wireless access points. It enables QoS, port security, storm control, DHCP snooping, and spanning-tree protection. It configures the access VLAN for the interface and provides network protection from unknown unicast packets.
CISCO_PHONE_AUTO_SMARTPORT	This macro applies the IP phone macro for Cisco IP phones. It enables QoS, port security, storm control, DHCP snooping, and spanning-tree protection. It also configures the access and voice VLANs for that interface.
CISCO_ROUTER_AUTO_SMARTPORT	This macro applies the router macro for Cisco routers. It enables QoS and trunking with 802.1Q encapsulation and spanning-tree bridge protocol data unit (BPDU) protection.
CISCO_SWITCH_AUTO_SMARTPORT	This macro applies the switch macro for Cisco switches. It enables QoS and trunking with 802.1q encapsulation. It also configures the native VLAN on the interface.

Use these macros when the switch does not use device-specific macros.

**Table 2-2** *Global and Custom Macros*

Macro Name	Description
CISCO_CUSTOM_AUTO_SMARTPORT	This macro applies the per-port user-defined settings after the antimacro <sup>1</sup> is applied on a switch port. You specify the settings in the macro.
CISCO_LAST_RESORT_AUTO_SMARTPORT	This macro applies a per-port device-specific macro when the switch does not have built-in macro for the device. It has a basic configuration with a data VLAN.
CISCO_SWITCH_AAA_ACCOUNTING	This macro applies the authentication, authorization, and accounting (AAA) accounting settings.
CISCO_SWITCH_AAA_AUTHENTICATION	This macro applies the authentication, authorization, and accounting (AAA) authentication settings.
CISCO_SWITCH_AAA_AUTHORIZATION	This macro applies the authentication, authorization, and accounting (AAA) authorization settings.
CISCO_SWITCH_AUTO_IP_CONFIG	This macro applies the IP settings
CISCO_SWITCH_AUTO_PCI_CONFIG	This macro applies Payment Card Industry (PCI)-compliant settings.
CISCO_SWITCH_DOMAIN_NAME_CONFIG	This macro applies the domain name.
CISCO_SWITCH_ETHERCHANNEL_CONFIG	This macro applies the EtherChannel settings.
CISCO_SWITCH_HOSTNAME_CONFIG	This macro applies the hostname.
CISCO_SWITCH_HTTP_SERVER_CONFIG	This macro applies the HTTP server settings.
CISCO_SWITCH_LOGGING_SERVER_CONFIG	This macro applies the logging server settings.
CISCO_SWITCH_MGMT_VLAN_CONFIG	This macro applies the management VLAN settings.

**Table 2-2 Global and Custom Macros (continued)**

Macro Name	Description
CISCO_SWITCH_NAME_SERVER_CONFIG	This macro applies the name server settings.
CISCO_SWITCH_NTP_SERVER_CONFIG	This macro applies the Network Time Protocol (NTP) server settings.
CISCO_SWITCH_RADIUS_SERVER_CONFIG	This macro applies the RADIUS server settings.
CISCO_SWITCH_SETUP_SNMP_TRAPS	This macro applies the Simple Network Management Protocol (SNMP) trap settings.
CISCO_SWITCH_SETUP_USR_CONFIG	This macro applies user settings.
CISCO_SWITCH_SNMP_SOURCE_CONFIG	This macro applies the SNMP source interface settings.
CISCO_SWITCH_TACACS_SERVER_CONFIG	This macro applies the TACACS server settings.
CISCO_SWITCH_USER_PASS_CONFIG	This macro applies the username and password settings.

1. The antimacro is the portion of the applied macro that removes the macro at a link-down event.

In Cisco IOS Release 12.2(55)SE

- The switch applies the CISCO\_PHONE\_AUTO\_SMARTPORT macro to these IP phones:
  - Cisco IP Phone 8961
  - Cisco IP Phone 9951
  - Cisco IP Phone 9971
- The access point macros have these enhancements:
  - The switch uses the platform string in the CDP message to determine the access point type (autonomous or lightweight) and then applies the appropriate macro.
  - To reduce overrun errors at the ingress interface on an access point Ethernet receiver, the switch adds the QoS bandwidth setting to the access point macros when it receives a CDP message with the auto-QoS type, length, and value attributes (TLVs). QoS derives the bandwidth value from the auto-QoS TLVs.

If the CDP messages does not have the auto-QoS TLVs, the switch does not add the bandwidth setting to the macros.



**Note**

If you do not upgrade the access point image to one that has the auto-QoS TLVs, the switch does not add the bandwidth setting to the access point macros. When you configure the bandwidth before the link to the receiver goes down, the setting is removed when the link comes up.

If you add a macro command that sets the QoS bandwidth and the switch applies the macro to an access point that does not support the auto-QoS TLVs, the command is not applied to the access point. We recommend that you create a user-defined macro without that command.

- When a Catalyst 3750-E and 3560-E switch is connected to a Cisco Aironet 1250 access point, the switch applies a power setting to allocate up to 20 watts (W).

## Configuring Auto Smartports Parameter Values

The switch automatically maps from event triggers to built-in device-specific macros. You can follow this optional procedure to replace macro default parameter values with values that are specific to your switch.

Beginning in privileged EXEC mode:

	Command	Purpose
Step 1	<code>show macro auto device</code>	Displays the macro default parameter values.
Step 2	<code>configure terminal</code>	Enters global configuration mode.
Step 3	<code>macro auto device { access-point   ip-camera   lightweight-ap   media-player   phone   router   switch } [parameter=value]</code>	<p>Replaces the specified macro default parameter values.</p> <p>Enter new values in the form of a name-value pair separated by spaces: [<code>&lt;name1&gt;=&lt;value1&gt; &lt;name2&gt;=&lt;value2&gt;...</code>].</p> <p>You can enter the VLAN ID or the VLAN name when specifying VLAN parameter values.</p> <p>Default values are shown for each macro default parameter value.</p> <ul style="list-style-type: none"> <li>• <code>access-point NATIVE_VLAN=1</code></li> <li>• <code>ip-camera ACCESS_VLAN=1</code></li> <li>• <code>lightweight-ap ACCESS_VLAN=1</code></li> <li>• <code>media-player ACCESS_VLAN=1</code></li> <li>• <code>phone ACCESS_VLAN=1 VOICE_VLAN=2</code></li> <li>• <code>router NATIVE_VLAN=1</code></li> <li>• <code>switch NATIVE_VLAN=1</code></li> </ul> <p><b>Note</b> You must enter the correct parameter name (for example, <code>VOICE_VLAN</code>) because this text string must match the text string in the built-in macro definition.</p>
Step 4	<code>end</code>	Returns to privileged EXEC mode.
Step 5	<code>show macro auto device</code>	Verifies your entries.
Step 6	<code>copy running-config startup-config</code>	(Optional) Saves your entries in the configuration file.

To return to the default setting, use the `no macro auto device {macro name} parameter=value` global configuration command.

This example shows how to see the IP phone macro parameter values and how to change the default voice VLAN to 20. When you change the default values, they are not immediately applied on the interfaces with existing applied macros. The configured values are applied at the next link-up event. Note that the exact text string was used for `VOICE_VLAN`. The entry is case sensitive.

```
Switch# show macro auto device phone
Device:phone
Default Macro:CISCO_PHONE_AUTO_SMARTPORT
Current Macro:CISCO_PHONE_AUTO_SMARTPORT
```



```
Configurable Parameters:ACCESS_VLAN VOICE_VLAN
Defaults Parameters:ACCESS_VLAN=1 VOICE_VLAN=2
Current Parameters:ACCESS_VLAN=1 VOICE_VLAN=2

Switch# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)# macro auto device phone VOICE_VLAN=20
Switch(config)# end
Switch# show macro auto device phone
Device:phone
Default Macro:CISCO_PHONE_AUTO_SMARTPORT
Current Macro:CISCO_PHONE_AUTO_SMARTPORT
Configurable Parameters:ACCESS_VLAN VOICE_VLAN
Defaults Parameters:ACCESS_VLAN=1 VOICE_VLAN=2
Current Parameters:voice_vlan=20
```

## Configuring MAC Address Groups

For devices such as printers that do not support neighbor discovery protocols such as CDP or LLDP, use the MAC-address-based trigger configurations. This optional procedure requires these steps:

1. Configure a MAC-address-based trigger by using the **macro auto mac-address** global configuration command.
2. Associate the MAC address trigger to a built-in or a user-defined macro by using the **macro auto execute** global configuration command.

Beginning in privileged EXEC mode:

	Command	Purpose
Step 1	<b>configure terminal</b>	Enters global configuration mode.
Step 2	<b>macro auto mac-address-group</b> <i>name</i>	Specifies the group name, and enter MAC address configuration mode.
Step 3	[ <b>mac-address list</b> <i>list</i> ]   [ <b>oui</b> [ <i>list list</i>   <b>range</b> <i>start-value size number</i> ]]	Configures a list of MAC addresses separated by spaces.  Specify an operationally unique identifier (OUI) <b>list</b> or <b>range</b> . The OUI is the first three bytes of the MAC address and identifies the manufacturer of the product. Specifying the OUI allows devices that do not support neighbor discovery protocols to be recognized. <ul style="list-style-type: none"> <li>• <b>list</b>—Enter an OUI list in hexadecimal format separated by spaces.</li> <li>• <b>range</b>—Enter the starting OUI hexadecimal value (<i>start-value</i>).</li> <li>• <b>size</b>—Enter the length of the range (<i>number</i>) from 1 to 5 to create a list of sequential addresses.</li> </ul>
Step 4	<b>exit</b>	Returns to configuration mode.
Step 5	<b>macro auto execute</b> <i>address_trigger</i> <b>built-in</b> <i>macro name</i>	Maps the MAC address-group trigger to a built-in or user-defined macro.  The MAC address trigger is applied to an interface after 65 seconds. The switch uses this hold time to apply a CDP- or LLDP-based event trigger instead of the MAC address trigger.
Step 6	<b>end</b>	Returns to privileged EXEC mode.
Step 7	<b>show macro auto address-group</b>	Verifies your entries.
Step 8	<b>copy running-config startup-config</b>	(Optional) Saves your entries in the configuration file.

To delete an address group, use the **no macro auto mac-address-group** *name* global configuration command. Enter **no macro auto mac-address-group** *name* to remove the macro trigger and any associated trigger that maps to a macro defined by the **macro auto execute** global configuration command. Entering **no macro auto execute mac-address-group** only removes the mapping of the trigger to the macro.

This example shows how to create a MAC-address-group event trigger called *address\_trigger* and how to verify your entries:

```
Switch# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)# macro auto mac-address-group address_trigger
Switch(config-addr-grp-mac)# mac-address list 2222.3333.3334 22.33.44 a.b.c
Switch(config-addr-grp-mac)# oui list 455555 233244
Switch(config-addr-grp-mac)# oui range 333333 size 2
Switch(config-addr-grp-mac)# exit
Switch(config)# macro auto execute address_trigger builtin CISCO_PHONE_AUTO_SMARTPORT
Switch(config)# end
Switch# show running configuration | include macro
macro auto mac-address-group address_trigger
mac auto mac-address-group hel
mac auto execute address_trigger builtin CISCO_PHONE_AUTO_SMARTPORT
  macro description CISCO_DMP_EVENT
  mac description CISCO_SWITCH_EVENT
!
```

<output truncated>

The example shows how to create an OUI list with five sequential addresses starting with 00000A and how to verify your entries:

```
Switch# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)# macro auto mac-address-group size5ouilist
Switch(config-addr-grp-mac)# oui range 00000A size 5
Switch(config-addr-grp-mac)# exit
Switch(config)# mac auto execute size5-ouilist builtin macro
Switch(config)# macro auto execute address_trigger builtin CISCO_PHONE_AUTO_SMARTPORT
Switch(config)# end
Switch# show running configuration | include oui
oui list 00000E
oui list 00000D
oui list 00000C
oui list 00000B
oui list 00000A
```

## Configuring Macro Persistence

When you enable Auto Smartports on the switch, by default the macro configuration is applied at a link-up event and removed at a link-down event. When you enable macro persistence, the configuration is applied at link-up and is not removed at link-down. The applied configuration remains. Macro persistence remains configured after a reboot if you have saved the running configuration file.

Follow this optional procedure so that enable macros remain active on the switch after a link-down event.

Beginning in privileged EXEC mode:

	Command	Purpose
Step 1	<b>configure terminal</b>	Enters global configuration mode.
Step 2	<b>interface</b> <i>interface-id</i>	Specifies an interface and enters interface configuration mode.
Step 3	<b>macro auto sticky</b>	Enables macros to remain active on the interface after a link-down event.
Step 4	<b>end</b>	Returns to privileged EXEC mode.
Step 5	<b>show running-config interface</b> <i>interface-id</i>	Verifies your entries.
Step 6	<b>copy running-config startup-config</b>	(Optional) Saves your entries in the configuration file.

To disable macro persistence, use the **no macro auto sticky** interface configuration command.

This example shows how to enable macro persistence on an interface:

```
Switch# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)# interface gigabitethernet 2/0/1
Switch(config-if)# macro auto port sticky
Switch(config-if)# exit
Switch(config)# end
Switch# show running-config interface gigabitethernet 2/0/1
Building configuration...

Current configuration : 243 bytes
!
<output truncated>
!
interface GigabitEthernet2/0/1
 srr-queue bandwidth share 1 30 35 5
 queue-set 2
 priority-queue out
 mls qos trust device cisco-phone
 mls qos trust cos
 macro auto port sticky
  service-policy input AUTOQOS-ENHANCED-CISCOPHONE-POLICY
end

<output truncated>

Switch#
```

## Configuring Built-In Macro Options

Use this procedure to map event triggers to built-in macros and to replace the built-in macro default parameters with values that are specific to your switch. If you need to *replace* default parameters values in a macro, use the **macro auto device** global configuration command. All commands in this procedure are optional.

Beginning in privileged EXEC mode:

Command	Purpose
Step 1 <b>configure terminal</b>	Enters global configuration mode.
Step 2 <b>macro auto execute</b> <i>event trigger</i> <b>builtin</b> <i>built-in macro name</i> [ <i>parameter=value</i> ] [ <i>parameter=value</i> ]	<p>Defines mapping from an event trigger to a built-in macro.</p> <p>Specify an <i>event trigger</i>:</p> <ul style="list-style-type: none"> <li>• CISCO_CUSTOM_EVENT</li> <li>• CISCO_DMP_EVENT</li> <li>• CISCO_IPVSC_EVENT</li> <li>• CISCO_LAST_RESORT_EVENT</li> <li>• CISCO_PHONE_EVENT</li> <li>• CISCO_ROUTER_EVENT</li> <li>• CISCO_SWITCH_EVENT</li> <li>• CISCO_WIRELESS_AP_EVENT</li> <li>• CISCO_WIRELESS_LIGHTWEIGHT_AP_EVENT</li> <li>• WORD—Apply a user-defined event trigger.</li> </ul> <p>Specify a <b>builtin</b> <i>built-in macro name</i>:</p> <p>Enter new values in the form of <i>name value pair</i> separated by spaces: [<i>&lt;name1&gt;=&lt;value1&gt; &lt;name2&gt;=&lt;value2&gt;...</i>]. Default values are shown exactly as they should be entered.</p> <ul style="list-style-type: none"> <li>• CISCO_AP_AUTO_SMARTPORT Specify the parameter value: NATIVE_VLAN=1.</li> <li>• CISCO_DMP_AUTO_SMARTPORT Specify the parameter value: ACCESS_VLAN=1.</li> <li>• CISCO_IPVSC_AUTO_SMARTPORT Specify the parameter value: ACCESS_VLAN=1.</li> <li>• CISCO_LWAP_AUTO_SMARTPORT Specify the parameter value: ACCESS_VLAN=1.</li> <li>• CISCO_PHONE_AUTO_SMARTPORT Specify the parameter values: ACCESS_VLAN=1 and VOICE_VLAN=2.</li> <li>• CISCO_ROUTER_AUTO_SMARTPORT Specify the parameter value: NATIVE_VLAN=1.</li> <li>• CISCO_SWITCH_AUTO_SMARTPORT Specify the parameter value: NATIVE_VLAN=1.</li> </ul>

	Command	Purpose
Step 3	<code>remote url</code>	<p>Specifies a remote server location for the remote macro file:</p> <ul style="list-style-type: none"> <li>The syntax for the local flash file system on the standalone switch or the stack master: <b>flash:</b></li> <li>The syntax for the local flash file system on a stack member: <b>flash member number:</b></li> <li>The syntax for the FTP: <b>ftp:[[/username[:password]@location]/directory]/filename</b></li> <li>The syntax for an HTTP server: <b>http://[[username:password]@]{hostname   host-ip}[/directory]/filename</b></li> <li>The syntax for a secure HTTP server: <b>https://[[username:password]@]{hostname   host-ip}[/directory]/filename</b></li> <li>The syntax for NVRAM: <b>nvr:[[/username:password]@][/directory]/filename</b></li> <li>The syntax for the Remote Copy Protocol (RCP): <b>rcp:[[/username@location]/directory]/filename</b></li> <li>The syntax for the Secure Copy Protocol (SCP): <b>scp:[[/username@location]/directory]/filename</b></li> <li>The syntax for the TFTP: <b>tftp:[[/location]/directory]/filename</b></li> </ul>
Step 4	<code>end</code>	Returns to privileged EXEC mode.
Step 5	<code>show running-config</code>	Verifies your entries.
Step 6	<code>copy running-config startup-config</code>	Saves your entries in the configuration file.

This example shows how to use two built-in macros to connect Cisco switches and Cisco IP phones to the switch. This example modifies the default voice VLAN, access VLAN, and native VLAN for the trunk interface:

```
Switch# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)#!!! the next command modifies the access and voice vlans
Switch(config)#!!! for the built in Cisco IP phone auto smartport macro
Switch(config)# macro auto execute CISCO_PHONE_EVENT builtin CISCO_PHONE_AUTO_SMARTPORT
ACCESS_VLAN=10 VOICE_VLAN=20
Switch(config)#
Switch(config)#!!! the next command modifies the Native vlan used for inter switch trunks
Switch(config)# macro auto execute CISCO_SWITCH_EVENT builtin CISCO_SWITCH_AUTO_SMARTPORT
NATIVE_VLAN=10
Switch(config)#
Switch(config)#!!! the next command enables auto smart ports globally
Switch(config)# macro auto global processing cdp-fallback
Switch(config)#
Switch(config)# exit

Switch# !!! here is the running configuration of the interface connected
Switch# !!! to another Cisco Switch after the Macro is applied
Switch#
Switch# show running-config interface gigabitethernet1/0/1
Building configuration...
```

```

Current configuration : 284 bytes
!
interface GigabitEthernet1/0/1
interface GigabitEthernet0/1
switchport trunk encapsulation dot1q
switchport trunk native vlan 10
switchport mode trunk
srr-queue bandwidth share 10 10 60 20
queue-set 2
priority-queue out
mls qos trust cos
auto qos voip trust
macro description CISCO_SWITCH_EVENT
end

```

This example shows how to configure the remote macro for native VLAN 5.

- a. Configure the remote macro in the macro.txt file.
- b. Use the **macro auto execute** configuration command to specify the remote location for the macro file.

#### Macro.txt file

```

if [[ $LINKUP -eq YES ]]; then
  conf t
    interface $INTERFACE
      macro description $TRIGGER
      auto qos voip trust
      switchport trunk encapsulation dot1q
      switchport trunk native vlan $NATIVE_VLAN
      switchport trunk allowed vlan ALL
      switchport mode trunk
    exit
  end
else
  conf t
    interface $INTERFACE
      no macro description
      no auto qos voip trust
      no switchport mode trunk
      no switchport trunk encapsulation dot1q
      no switchport trunk native vlan $NATIVE_VLAN
      no switchport trunk allowed vlan ALL
    exit
  end
end

```

```

Switch(config)# macro auto execute CISCO_SWITCH_EVENT remote tftp://<ip_address>/macro.txt
NATIVE_VLAN=5

```

```

Switch# show running configuration | include macro
macro auto execute CISCO_SWITCH_EVENT remote tftp://<ip_address>/macro.txt
NATIVE_VLAN=5
Switch#

```

## Creating User-Defined Event Triggers

When using MAB or 802.1x authentication as an event trigger, create a trigger that corresponds to the Cisco attribute-value pair (**auto-smart-port=event trigger**) sent by the RADIUS server. This procedure is optional.

Beginning in privileged EXEC mode:

	Command	Purpose
Step 1	<b>configure terminal</b>	Enters global configuration mode.
Step 2	<b>shell trigger</b> <i>identifier description</i>	Specifies the event trigger identifier and description. The identifier should have no spaces or hyphens between words.
Step 3	<b>end</b>	Returns to privileged EXEC mode.
Step 4	<b>show shell triggers</b>	Displays the event triggers on the switch.
Step 5	<b>copy running-config startup-config</b>	(Optional) Saves your entries in the configuration file.

Use the **no shell trigger** *identifier* global configuration command to remove the event trigger.

This example shows how to map a user-defined event trigger called RADIUS\_MAB\_EVENT to the built-in macro CISCO\_AP\_AUTO\_SMARTPORT, to replace the default VLAN with VLAN 10, and how to verify the entries.

- a. Connect the device to a MAB-enabled switch port.
- b. On the RADIUS server, set the attribute-value pair to **auto-smart-port=RADIUS\_MAB\_EVENT**.
- c. On the switch, create the event trigger RADIUS\_MAB\_EVENT.
- d. The switch recognizes the attribute-value pair=RADIUS\_MAB\_EVENT response from the RADIUS server and applies the macro CISCO\_AP\_AUTO\_SMARTPORT.

```
Switch# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)# !!! create a user defined trigger and map
Switch(config)# !!! a system defined macro to it
Switch(config)# !!! first create the trigger event
Switch(config)# shell trigger RADIUS_MAB_EVENT MAC_AuthBypass Event
Switch(config)#
Switch(config)#!!! map a system defined macro to the trigger event
Switch(config)# macro auto execute RADIUS_MAB_EVENT builtin ?
CISCO_AP_AUTO_SMARTPORT      Configure native vlan and trust cos
CISCO_CUSTOM_AUTOSMARTPORT   Configure user defined parameters
CISCO_DMP_AUTO_SMARTPORT     Configure access vlan, qos and port-security
CISCO_IP_CAMERA_AUTO_SMARTPORT Configure access vlan, qos and port-security
CISCO_LAST_RESORT_SMARTPORT  Configure access vlan
CISCO_LWAP_AUTO_SMARTPORT    Configure native vlan, qos, port-security and
                              storm-control
CISCO_PHONE_AUTO_SMARTPORT   Configure access vlan, voice vlan, trust
                              device, interface bandwidth, port-security
CISCO_ROUTER_AUTO_SMARTPORT  Configure native vlan, spanning tree
                              port-fast,trunk mode and trust dscp
CISCO_SWITCH_AUTO_SMARTPORT  Configure native vlan, trunk mode
Switch(config)# macro auto execute RADIUS_MAB_EVENT builtin CISCO_AP_AUTO_SMARTPORT
ACCESS_VLAN=10
Switch(config)# exit
Switch# show shell triggers
User defined triggers
-----
Trigger Id: RADIUS_MAB_EVENT
Trigger description: MAC_AuthBypass Event
Trigger environment:
Trigger mapping function: CISCO_AP_SMARTPORT
<output truncated>
```

This example shows how to use the **show shell triggers** privileged EXEC command to view the event triggers in the switch software:

```
Switch# show shell triggers
User defined triggers
-----
Built-in triggers
-----
Trigger Id: CISCO_CUSTOM_EVENT
Trigger description: Custom macroevent to apply user defined configuration
Trigger environment: User can define the macro
Trigger mapping function: CISCO_CUSTOM_AUTOSMARTPORT

Trigger Id: CISCO_DMP_EVENT
Trigger description: Digital media-player device event to apply port configuration
Trigger environment: Parameters that can be set in the shell - $ACCESS_VLAN=(1)
The value in the parenthesis is a default value
Trigger mapping function: CISCO_DMP_AUTO_SMARTPORT

Trigger Id: CISCO_IPVSC_EVENT
Trigger description: IP-camera device event to apply port configuration
Trigger environment: Parameters that can be set in the shell - $ACCESS_VLAN=(1)
The value in parenthesis is a default value
Trigger mapping function: CISCO_IP_CAMERA_AUTO_SMARTPORT

Trigger Id: CISCO_LAST_RESORT_EVENT
Trigger description: Last resortevent to apply port configuration
Trigger environment: Parameters that can be set in the shell - $ACCESS_VLAN=(1)
The value in the parenthesis is a default value
Trigger mapping function: CISCO_LAST_RESORT_SMARTPORT

Trigger Id: CISCO_PHONE_EVENT
Trigger description: IP-phone device event to apply port configuration
Trigger environment: Parameters that can be set in the shell - $ACCESS_VLAN=(1)
and $VOICE_VLAN=(2), The value in the parenthesis is a default value
Trigger mapping function: CISCO_PHONE_AUTO_SMARTPORT

Trigger Id: CISCO_ROUTER_EVENT
Trigger description: Router device event to apply port configuration
Trigger environment: Parameters that can be set in the shell - $NATIVE_VLAN=(1)
The value in the parenthesis is a default value
Trigger mapping function: CISCO_ROUTER_AUTO_SMARTPORT

Trigger Id: CISCO_SWITCH_ETHERCHANNEL_CONFIG
Trigger description: etherchannel parameter
Trigger environment: $INTERFACE_LIST=(), $PORT-CHANNEL_ID=(),
                    $SEC_MODE=(), $SEC_PROTOCOLTYPE=(),
                    PORT-CHANNEL_TYPE=()
Trigger mapping function: CISCO_ETHERCHANNEL_AUTOSMARTPORT

Trigger Id: CISCO_SWITCH_EVENT
Trigger description: Switch device event to apply port configuration
Trigger environment: Parameters that can be set in the shell - $NATIVE_VLAN=(1)
The value in the parenthesis is a default value
Trigger mapping function: CISCO_SWITCH_AUTO_SMARTPORT

Trigger Id: CISCO_WIRELESS_AP_EVENT
Trigger description: Autonomous ap device event to apply port configuration
Trigger environment: Parameters that can be set in the shell - $NATIVE_VLAN=(1)
The value in the parenthesis is a default value
Trigger mapping function: CISCO_AP_AUTO_SMARTPORT

Trigger Id: CISCO_WIRELESS_LIGHTWEIGHT_AP_EVENT
Trigger description: Lightweight-ap device event to apply port configuration
```



Trigger environment: Parameters that can be set in the shell - \$ACCESS\_VLAN=(1)  
 The value in the parenthesis is a default value  
 Trigger mapping function: CISCO\_LWAP\_AUTO\_SMARTPORT

Trigger Id: word  
 Trigger description: word  
 Trigger environment:  
 Trigger mapping function:

This example shows how to use the **show shell functions** privileged EXEC command to view the built-in macros in the switch software:

```
Switch# show shell functions
#User defined functions:

#Built-in functions:
function CISCO_AP_AUTO_SMARTPORT () {
    if [[ $LINKUP -eq YES ]]; then
        conf t
            interface $INTERFACE
                macro description $TRIGGER
                switchport trunk encapsulation dot1q
                switchport trunk native vlan $NATIVE_VLAN
                switchport trunk allowed vlan ALL
                switchport mode trunk
                switchport nonegotiate
                auto qos voip trust
                mls qos trust cos
                if [[ $LIMIT -eq 0 ]]; then
                    default srr-queue bandwidth limit
                else
                    srr-queue bandwidth limit $LIMIT
                fi
                if [[ $SW_POE -eq YES ]]; then
                    if [[ $AP125X -eq AP125X ]]; then
                        macro description AP125X
                        macro auto port sticky
                        power inline port maximum 20000
                    fi
                fi
            exit
        end
    fi
    if [[ $LINKUP -eq NO ]]; then
        conf t
            interface $INTERFACE
                no macro description
                no switchport nonegotiate
                no switchport trunk native vlan $NATIVE_VLAN
                no switchport trunk allowed vlan ALL
                no auto qos voip trust
                no mls qos trust cos
                default srr-queue bandwidth limit
                if [[ $AUTH_ENABLED -eq NO ]]; then
                    no switchport mode
                    no switchport trunk encapsulation
                fi
                if [[ $STICKY -eq YES ]]; then
                    if [[ $SW_POE -eq YES ]]; then
                        if [[ $AP125X -eq AP125X ]]; then
                            no macro auto port sticky
                            no power inline port maximum
                        fi
                    fi
                fi
            fi
        fi
    fi
}
```

```

        fi
    exit
end
fi
}
<output truncated>

```

## Configuring Event Trigger Control

Use event trigger control to specify when the switch applies macros. By default, the switch maps built-in and user-defined macros to these triggers:

- Detection method (for example, MAC address groups, MAB messages, 802.1x authentication messages, and LLDP messages)
- Device type (for example, Cisco switches, routers, and IP phones)
- Configured triggers

When you select triggers, the switch applies macros only when those triggers map to macros.

### On a Switch

Beginning in privileged EXEC mode:

	Command	Purpose
Step 1	<b>configure terminal</b>	Enters global configuration mode.
Step 2	<b>macro auto global control</b> { <b>detection</b> [ <b>cdp</b> ] [ <b>lldp</b> ] [ <b>mac-address</b> ]   <b>device</b> [ <b>access-point</b> ] [ <b>ip-camera</b> ] [ <b>lightweight-ap</b> ] [ <b>media-player</b> ] [ <b>phone</b> ] [ <b>router</b> ] [ <b>switch</b> ]   <b>trigger</b> [ <b>last-resort</b> ] }	<p>Specifies when the switch applies a macro based on the detection method, device type, or trigger.</p> <ul style="list-style-type: none"> <li>• <b>detection</b>—Use one or more of these as an event trigger: <ul style="list-style-type: none"> <li>– <b>cdp</b>—CDP messages</li> <li>– <b>lldp</b>—LLDP messages</li> <li>– <b>mac-address</b>—User-defined MAC address groups</li> </ul> </li> <li>• <b>device</b>—Use one or more of these devices as an event trigger: <ul style="list-style-type: none"> <li>– <b>access-point</b>—Autonomous access point</li> <li>– <b>ip-camera</b>—Cisco IP video surveillance camera</li> <li>– <b>lightweight-ap</b>—Lightweight access point</li> <li>– <b>media-player</b>—Digital media player</li> <li>– <b>phone</b>—Cisco IP phone</li> <li>– <b>router</b>—Cisco router</li> <li>– <b>switch</b>—Cisco switch</li> </ul> </li> <li>• <b>trigger</b>—Use a specific event trigger. <ul style="list-style-type: none"> <li>– (Optional) <b>last-resort</b>—Last-resort trigger.</li> </ul> </li> </ul> <p>By default, the switch uses all detection method, device types, and configured triggers.</p>

	Command	Purpose
Step 3	<b>end</b>	Returns to privileged EXEC mode.
Step 4	<b>show running-config</b>	Verifies your entries.
Step 5	<b>copy running-config startup-config</b>	(Optional) Saves your entries in the configuration file.

Use the **no macro auto global control** global configuration command to disable a specific trigger-to-macro mapping. The switch does not apply the macros mapped to the specific triggers.

To configure the switch to apply the CISCO\_AP\_AUTO\_SMARTPORT macro only when it detects an autonomous access point:

```
Switch# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)# macro auto global control device access-point
Switch(config)# end
```

To configure the switch to apply the CISCO\_AP\_AUTO\_SMARTPORT or the CISCO\_SWITCH\_AUTO\_IP\_CONFIG macro only when it detects an autonomous access point or a Cisco IP phone:

```
Switch# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)# macro auto global control device access-point phone
Switch(config)# end
```

## On an Interface

Beginning in privileged EXEC mode:

	Command	Purpose
Step 1	<b>configure terminal</b>	Enters global configuration mode.
Step 2	<b>interface <i>interface_id</i></b>	Specifies an interface and enters interface configuration mode.

	Command	Purpose
Step 3	<b>macro auto control</b> { <b>detection</b> [ <b>cdp</b> ] [ <b>lldp</b> ] [ <b>mac-address</b> ]   <b>device</b> [ <b>access-point</b> ] [ <b>ip-camera</b> ] [ <b>lightweight-ap</b> ] [ <b>media-player</b> ] [ <b>phone</b> ] [ <b>router</b> ] [ <b>switch</b> ]   <b>trigger</b> [ <b>last-resort</b> ] }	<p>Specifies when the switch applies a macro based on the detection method, device type, or trigger.</p> <ul style="list-style-type: none"> <li>• <b>detection</b>—Use one or more of these as an event trigger: <ul style="list-style-type: none"> <li>– <b>cdp</b>—CDP messages</li> <li>– <b>lldp</b>—LLDP messages</li> <li>– <b>mac-address</b>—User-defined MAC address groups</li> </ul> </li> <li>• <b>device</b>—Use one or more of these devices as an event trigger: <ul style="list-style-type: none"> <li>– <b>access-point</b>—Autonomous access point</li> <li>– <b>ip-camera</b>—Cisco IP video surveillance camera</li> <li>– <b>lightweight-ap</b>—Lightweight access point</li> <li>– <b>media-player</b>—Digital media player</li> <li>– <b>phone</b>—Cisco IP phone</li> <li>– <b>router</b>—Cisco router</li> <li>– <b>switch</b>—Cisco switch</li> </ul> </li> <li>• <b>trigger</b>—Use a specific event trigger. <ul style="list-style-type: none"> <li>– (Optional) <b>last-resort</b>—Last-resort trigger.</li> </ul> </li> </ul> <p>By default, the switch uses all detection method, device types, and configured triggers.</p>
Step 4	<b>exit</b>	Returns to global configuration mode.
Step 5	<b>end</b>	Returns to privileged EXEC mode.
Step 6	<b>show macro auto</b>	Verifies your entries.
Step 7	<b>copy running-config startup-config</b>	(Optional) Saves your entries in the configuration file.

Use the **no macro auto global control** global configuration command to disable a specific trigger-to-macro mapping. The switch does not apply the macros mapped to the specific triggers.

To configure the switch to apply the CISCO\_AP\_AUTO\_SMARTPORT or CISCO\_PHONE\_AUTO\_SMARTPORT macro only when it detects a lightweight access point or a Cisco IP phone:

```
Switch# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)# interface gigabitethernet 5/0/1
Switch(config-if)# macro auto control device lightweight-ap phone
Switch(config-if)# exit
Switch(config)# end
```

## Configuring User-Defined Macros

The Cisco IOS shell has basic scripting capabilities for configuring user-defined macros. These macros can contain multiple lines and can include any CLI command. You can also define variable-substitution, conditionals, functions, and triggers within the macro. This procedure is optional.

**Note**

When configuring macros, you must enter a description. If the link is down (command `$LINKUP -eq NO`), you must enter the **no macro description** command. These commands are mandatory for Auto Smartports to work.

Beginning in privileged EXEC mode, follow these steps to map a user-defined event trigger to a user-defined macro.

	Command	Purpose
Step 1	<code>configure terminal</code>	Enters global configuration mode.
Step 2	<code>macro auto execute event trigger [parameter=value] {function contents}</code>	Specifies a user-defined macro that maps to an event trigger.  <i>{function contents}</i> Specify a user-defined macro to associate with the trigger. Enter the macro contents within braces. Begin the Cisco IOS shell commands with the left brace and end the command grouping with the right brace.  (Optional) <i>parameter=value</i> —Replace default values that begin with \$, and enter new values in the form of name value pair separated by spaces: [ <i>&lt;name1&gt;=&lt;value1&gt; &lt;name2&gt;=&lt;value2&gt;...</i> ].
Step 3	<code>end</code>	Returns to privileged EXEC mode.
Step 4	<code>show running-config</code>	Verifies your entries.
Step 5	<code>copy running-config startup-config</code>	(Optional) Saves your entries in the configuration file.

## Example: User-Defined Event Trigger and Macro

This example shows how to map a user-defined event trigger called media player to a user-defined macro.

- a. Connect the media player to an 802.1x- or MAB-enabled switch port.
- b. On the RADIUS server, set the attribute-value pair to **auto-smart-port =MP\_EVENT**.
- c. On the switch, create the event trigger MP\_EVENT, and enter the user-defined macro commands in the CLI example.
- d. The switch recognizes the attribute-value pair=MP\_EVENT response from the RADIUS server and applies the macro associated with this event trigger.

```
Switch(config)# shell trigger MP_EVENT mediaplayer
Switch(config)# macro auto execute MP_EVENT {
if [[ $LINKUP -eq YES ]]; then
conf t
interface $INTERFACE
macro description $TRIGGER
switchport access vlan 1
switchport mode access
switchport port-security
switchport port-security maximum 1
switchport port-security violation restrict
switchport port-security aging time 2
switchport port-security aging type inactivity
spanning-tree portfast
spanning-tree bpduguard enable
exit
fi
```

```

if [[ $LINKUP -eq NO ]]; then
conf t
interface $INTERFACE
    no macro description
    no switchport access vlan 1
    if [[ $AUTH_ENABLED -eq NO ]]; then
        no switchport mode access
    fi
    no switchport port-security
    no switchport port-security maximum 1
    no switchport port-security violation restrict
    no switchport port-security aging time 2
    no switchport port-security aging type inactivity
    no spanning-tree portfast
    no spanning-tree bpduguard enable
    exit
fi
}
Switch(config)# end

```

## Example: Last-Resort Event Trigger and Macro

To map the CISCO\_LAST\_RESORT\_AUTO\_SMARTPORT macro to the last-resort trigger:

```
Switch(config)# macro auto global control trigger last-resort
```

CISCO\_LAST\_RESORT\_AUTO\_SMARTPORT macro:

```

if [[ $LINKUP -eq YES ]]; then
    conf t
        interface $INTERFACE
            macro description $TRIGGER
            switchport access vlan $ACCESS_VLAN
            switchport mode access
            spanning-tree portfast
            spanning-tree bpdufilter enable
            load-interval 60
            no shutdown
        exit
    end
fi
if [[ $LINKUP -eq NO ]]; then
    conf t
        interface $INTERFACE
            no macro description
            no switchport access vlan $ACCESS_VLAN
            no switchport mode access
            no spanning-tree portfast
            no spanning-tree bpdufilter enable
            no load-interval 60
        exit
    end
fi

```

Example of user-defined mapping of a MAC address trigger to map a last-resort macro:

```

Switch(config)#macro auto mac
Switch(config)#macro auto mac-address-group Laptop
Switch(config-addr-grp-mac)#mac-address list 0000.0011.2233
Switch(config-addr-grp-mac)#exit
Switch(config)#macro auto execute laptop builtin CISCO_LAST_RESORT_SMARTPORT
ACCESS_VLAN=10

```

```
Switch(config)#end
Switch#
```

## Example: Custom Event Trigger and CISCO\_CUSTOM\_AUTO\_SMARTPORT Macro

Default CISCO\_CUSTOM\_AUTO\_SMARTPORT macro:

```
if [[ $LINKUP -eq YES ]]; then
    conf t
        interface $INTERFACE
        exit
    end
fi
if [[ $LINKUP -eq NO ]]; then
    conf t
        interface $INTERFACE
        exit
    end
fi
```

To create a user-defined macro with the same name as the custom macro, override the CISCO\_CUSTOM\_AUTO\_SMARTPORT macro, and set the parameters for your switch, including the mapping from an event trigger to the macro.

```
Config# macro auto execute CISCO_CUSTOM_EVENT {
    if [[ $LINKUP -eq YES ]]; then
        conf t
            interface $INTERFACE
            description asp3-link-UP i.e. Custom Macro OFF
            no macro description
            switchport
            switchport mode access
            switchport access vlan $ACCESS_VLAN
            spanning-tree portfast
            exit
        end
    fi
    if [[ $LINKUP -eq NO ]]; then
        conf t
            interface $INTERFACE
            macro description $TRIGGER
            switchport access vlan $ACCESS_VLAN
            description asp3-link-DOWN i.e. Custom Macro ON
            exit
        end
    fi
}
```

**Table 2-3** Supported Cisco IOS Shell Keywords

Command	Description
{	Begin the command grouping.
}	End the command grouping.
[[	Use as a conditional construct.
]]	Use as a conditional construct.
else	Use as a conditional construct.

**Table 2-3 Supported Cisco IOS Shell Keywords (continued)**

Command	Description
-eq	Use as a conditional construct.
fi	Use as a conditional construct.
if	Use as a conditional construct.
then	Use as a conditional construct.
-z	Use as a conditional construct.
\$	Variables that begin with the \$ character are replaced with a parameter value.
#	Use the # character to enter comment text.

**Table 2-4 Unsupported Cisco IOS Shell Reserved Keywords**

Command	Description
	Pipeline.
case	Conditional construct.
esac	Conditional construct.
for	Looping construct.
function	Shell function.
in	Conditional construct.
select	Conditional construct.
time	Pipeline.
until	Looping construct.
while	Looping construct.

## Applying Macros on a Switch

You can use the CLI or the Cisco IOS shell scripting capability to set the macro parameters and to apply the macro.

To remove the macro, enter the **no** forms of the macro commands.

### Using the CLI

Beginning in privileged EXEC mode:

	Command	Purpose
Step 1	<b>macro auto config ?</b>	(Optional) Displays the global macros.
Step 2	<b>macro auto config <i>global macro</i></b>	Sets the macro parameters. Follow the prompts in the CLI.
Step 3	<b>copy running-config startup-config</b>	(Optional) Saves your entries in the configuration file.



**Example: One Macro**

To display the global macros:

```
Switch# macro auto apply ?
CISCO_SWITCH_AAA_ACCOUNTING          Configure aaa accounting parameters
CISCO_SWITCH_AAA_AUTHENTICATION       Configure aaa authentication parameters
CISCO_SWITCH_AAA_AUTHORIZATION        Configure aaa authorization parameters
CISCO_SWITCH_AUTO_IP_CONFIG           Configure the ip parameters
CISCO_SWITCH_AUTO_PCI_CONFIG          Configure PCI compliant parameters
CISCO_SWITCH_DOMAIN_NAME_CONFIG       Configure domain name
CISCO_SWITCH_ETHERCHANNEL_CONFIG      Configure the etherchannel parameters
CISCO_SWITCH_HOSTNAME_CONFIG          Configure hostname
CISCO_SWITCH_HTTP_SERVER_CONFIG       Configure http server
CISCO_SWITCH_LOGGING_SERVER_CONFIG    Configure logging server
CISCO_SWITCH_MGMT_VLAN_CONFIG         Configure management vlan parameters
CISCO_SWITCH_NAME_SERVER_CONFIG       Configure name server parameters
CISCO_SWITCH_NTP_SERVER_CONFIG        Configure NTP server
CISCO_SWITCH_RADIUS_SERVER_CONFIG     Configure radius server
CISCO_SWITCH_SETUP_SNMP_TRAPS         Configure SNMP trap parameters
CISCO_SWITCH_SETUP_USR_CONFIG         Configure the user parameters
CISCO_SWITCH_SNMP_SOURCE_CONFIG       Configure snmp source interface
CISCO_SWITCH_TACACS_SERVER_CONFIG     Configure tacacs server
CISCO_SWITCH_USER_PASS_CONFIG         Configure username and password

Switch# macro auto config ?
CISCO_SWITCH_AAA_ACCOUNTING          Configure aaa accounting parameters
CISCO_SWITCH_AAA_AUTHENTICATION       Configure aaa authentication parameters
CISCO_SWITCH_AAA_AUTHORIZATION        Configure aaa authorization parameters
CISCO_SWITCH_AUTO_IP_CONFIG           Configure the ip parameters
CISCO_SWITCH_AUTO_PCI_CONFIG          Configure PCI compliant parameters
CISCO_SWITCH_DOMAIN_NAME_CONFIG       Configure domain name
CISCO_SWITCH_ETHERCHANNEL_CONFIG      Configure the etherchannel parameters
CISCO_SWITCH_HOSTNAME_CONFIG          Configure hostname
CISCO_SWITCH_HTTP_SERVER_CONFIG       Configure http server
CISCO_SWITCH_LOGGING_SERVER_CONFIG    Configure logging server
CISCO_SWITCH_MGMT_VLAN_CONFIG         Configure management vlan parameters
CISCO_SWITCH_NAME_SERVER_CONFIG       Configure name server parameters
CISCO_SWITCH_NTP_SERVER_CONFIG        Configure NTP server
CISCO_SWITCH_RADIUS_SERVER_CONFIG     Configure radius server
CISCO_SWITCH_SETUP_SNMP_TRAPS         Configure SNMP trap parameters
CISCO_SWITCH_SETUP_USR_CONFIG         Configure the user parameters
CISCO_SWITCH_SNMP_SOURCE_CONFIG       Configure snmp source interface
CISCO_SWITCH_TACACS_SERVER_CONFIG     Configure tacacs server
CISCO_SWITCH_USER_PASS_CONFIG         Configure username and password

Switch# macro auto config CISCO_SWITCH_HOSTNAME_CONFIG
Enter system's network name: CISCO
Do you want to apply the parameters? [yes/no]: yes
Enter configuration commands, one per line.  End with CNTL/Z.
Switch# macro auto apply CISCO_SWITCH_HOSTNAME_CONFIG
Enter configuration commands, one per line.  End with CNTL/Z.
CISCO#
```

**Example: Combined Macros**

```
Switch# macro auto config CISCO_SWITCH_AUTO_IP_CONFIG
Do you want to configure default domain name? [yes/no]: yes
Enter the domain name: cisco.com
Do you want to configure Name server ipv4 address? [yes/no]: yes
Enter the IPv4 address[a.b.c.d]: 10.77.11.34
Enter IP address of the logging host: 10.77.11.36
```

```

Do you want to configure VPN Routing/Forwarding Instance name? [yes/no]: no
Enter the ip address of NTP server[a.b.c.d]: 10.77.11.37
Do you want to apply the parameters? [yes/no]: yes
Enter configuration commands, one per line. End with CNTL/Z.
Enter configuration commands, one per line. End with CNTL/Z.
Enter configuration commands, one per line. End with CNTL/Z.
Enter configuration commands, one per line. End with CNTL/Z.
Switch# macro auto apply CISCO_SWITCH_AUTO_IP_CONFIG
Enter configuration commands, one per line. End with CNTL/Z.
Switch#

```

## Using the Cisco IOS Shell

Beginning in privileged EXEC mode:

	Command	Purpose
Step 1	<b>macro auto config ?</b> or <b>macro auto apply ?</b>	(Optional) Displays the global macros.
Step 2	<b>macro auto config <i>macro-name</i> <i>parameter=value</i> [<i>parameter=value</i>] ...</b>	Sets the macro parameters. Follow the prompts in the CLI.
Step 3	<b>macro auto apply <i>macro-name</i></b>	Applies the macro to the switch.
Step 4	<b>show macro auto</b>	Verifies your entries. The user-defined values appear only in the <b>show</b> command output.
Step 5	<b>copy running-config startup-config</b>	(Optional) Saves your entries in the configuration file.

### Example: One Single Shell Parameter for One Macro

```

Switch# macro auto config CISCO_SWITCH_HOSTNAME_CONFIG HOSTNAME=CISCO
Switch# macro auto apply CISCO_SWITCH_HOSTNAME_CONFIG
Enter configuration commands, one per line. End with CNTL/Z.
CISCO#

```

### Example: Multiple Shell Parameters and Values for One Macro

```

Switch# macro auto config CISCO_SWITCH_ETHERCHANNEL_CONFIG PORT_CH_ID=1 PORT_CH_TYPE=2
EC_PROTO=Y EC_PROTO_TYPE=PAGP NO_OF_INT=3 MODE=AUTO INTERFACE=Gig2/0/1,Gig2/0/2,Gig2/0/3
NON_SILENT=Y EC_APPLY=YES
Switch# macro auto apply CISCO_SWITCH_ETHERCHANNEL_CONFIG
Enter configuration commands, one per line. End with CNTL/Z.
Switch#

```

### Example: Combined Macros

```

Switch# macro auto config CISCO_SWITCH_AUTO_IP_CONFIG CISCO_SWITCH_DOMAIN_NAME_CONFIG
DOMAIN_NAME=cisco.com
Switch# macro auto config CISCO_SWITCH_AUTO_IP_CONFIG CISCO_SWITCH_LOGGING_SERVER_CONFIG
HOST_IP=10.77.11.36
Switch# macro auto config CISCO_SWITCH_AUTO_IP_CONFIG CISCO_SWITCH_NAME_SERVER_CONFIG
IP_V4_ADDR=10.77.11.37

```

```
Switch# macro auto config CISCO_SWITCH_AUTO_IP_CONFIG CISCO_SWITCH_NTP_SERVER_CONFIG
IP_ADDRESS=10.77.11.38 VRF=NO
Switch# macro auto apply CISCO_SWITCH_AUTO_IP_CONFIG
Enter configuration commands, one per line. End with CNTL/Z.
Switch#
```

## Default Static Smartports Configuration

There are no static Smartports macros enabled on the switch.

**Table 2-5** Default Static Smartports Macros

Macro Name <sup>1</sup>	Description
<b>cisco-global</b>	Use this global configuration macro to enable rapid per-VLAN spanning-tree plus (PVST+), loop guard, and dynamic port-error recovery for link state failures.
<b>cisco-desktop</b>	Use this interface configuration macro for increased network security and reliability when connecting a desktop device, such as a PC, to a switch port.
<b>cisco-phone</b>	Use this interface configuration macro when connecting a desktop device such as a PC with a Cisco IP Phone to a switch port. This macro is an extension of the <b>cisco-desktop</b> macro and provides the same security and resiliency feature and also dedicated voice VLANs to ensure proper treatment of delay-sensitive voice traffic.
<b>cisco-switch</b>	Use this interface configuration macro when connecting an access switch and a distribution switch or between access switches connected through small form-factor pluggable (SFP) modules.
<b>cisco-router</b>	Use this interface configuration macro when connecting the switch and a WAN router.
<b>cisco-wireless</b>	Use this interface configuration macro when connecting the switch and a wireless access point.

1. Cisco-default Smartports macros vary, depending on the software version running on your switch.

## Static Smartports Configuration Guidelines

- When a macro is applied globally to a switch or to a switch interface, the existing configuration on the interface is retained. This is helpful when applying an incremental configuration.
- If a command fails because of a syntax or a configuration error, the macro continues to apply the remaining commands. You can use the **macro global trace macro-name** global configuration command or the **macro trace macro-name** interface configuration command to apply and then debug the macro to find any syntax or configuration errors.
- Some CLI commands are specific to certain interface types. If you apply a macro to an interface that does not accept the configuration, the macro fails the syntax or the configuration check, and the switch returns an error message.
- Applying a macro to an interface range is the same as applying a macro to a single interface. When you use an interface range, the macro is applied sequentially to each interface within the range. If a macro command fails on one interface, it is still applied to the remaining interfaces.
- When you apply a macro to a switch or a switch interface, the macro name is automatically added to the switch or interface. You can display the macro names and applied commands using the **show running-config** user EXEC command.

## Applying Static Smartports Macros

Beginning in privileged EXEC mode, follow these steps to apply a static Smartports macro:

	Command	Purpose
Step 1	<b>show parser macro</b>	Displays the Cisco-default static Smartports macros embedded in the switch software.
Step 2	<b>show parser macro name</b> <i>macro-name</i>	Displays the specific macro that you want to apply.
Step 3	<b>configure terminal</b>	Enters global configuration mode.
Step 4	<b>macro global</b> { <b>apply</b>   <b>trace</b> } <i>macro-name</i> [ <b>parameter</b> { <i>value</i> }] [ <b>parameter</b> { <i>value</i> }] [ <b>parameter</b> { <i>value</i> }]	<p>Applies a macro on the switch:</p> <ul style="list-style-type: none"> <li>To only apply each individual macro command, use the <b>macro global apply</b> <i>macro-name</i> command.</li> <li>To apply and then debug a macro to find any syntax or configuration errors, use the <b>macro global trace</b> <i>macro-name</i>.</li> </ul> <p>Append the macro with the required values by using the <b>parameter value</b> keywords. Keywords that begin with \$ require a unique parameter value.</p> <p>You can use the <b>macro global apply</b> <i>macro-name</i> ? command to display a list of any required values for the macro. If you apply a macro without entering the keyword values, the commands are invalid and are not applied.</p> <p>(Optional) Specify unique parameter values that are specific to the switch. You can enter up to three keyword-value pairs. Parameter keyword matching is case sensitive. The corresponding value replaces all matching occurrences of the keyword.</p>
Step 5	<b>interface</b> <i>interface-id</i>	(Optional) Specifies an interface and enters interface configuration mode.
Step 6	<b>default interface</b> <i>interface-id</i>	(Optional) Clears all configuration from the specified interface.
Step 7	<b>macro</b> { <b>apply</b>   <b>trace</b> } <i>macro-name</i> [ <b>parameter</b> { <i>value</i> }] [ <b>parameter</b> { <i>value</i> }] [ <b>parameter</b> { <i>value</i> }]	<p>Applies a macro on the interface:</p> <ul style="list-style-type: none"> <li>To only apply each individual macro command, use the <b>macro apply</b> <i>macro-name</i> command.</li> <li>To apply and then debug a macro to find any syntax or configuration errors, use the <b>macro trace</b> <i>macro-name</i>.</li> </ul> <p>Append the macro with the required values by using the <b>parameter value</b> keywords. Keywords that begin with \$ require a unique parameter value.</p> <p>You can use the <b>macro global apply</b> <i>macro-name</i> ? command to display a list of any required values for the macro. If you apply a macro without entering the keyword values, the commands are invalid and are not applied.</p> <p>(Optional) Specify unique parameter values that are specific to the switch. You can enter up to three keyword-value pairs. Parameter keyword matching is case sensitive. The corresponding value replaces all matching occurrences of the keyword.</p>

	Command	Purpose
Step 8	<b>end</b>	Return to privileged EXEC mode.
Step 9	<b>show running-config interface</b> <i>interface-id</i>	Verify that the macro is applied to the interface.
Step 10	<b>copy running-config startup-config</b>	(Optional) Save your entries in the configuration file.

You can only delete a global macro-applied configuration on a switch by entering the **no** version of each command in the macro. You can delete a macro-applied configuration on a port by entering the **default interface** *interface-id* interface configuration command.

This example shows how to display the **cisco-desktop** macro, to apply the macro, and to set the access VLAN ID to 25 on an interface:

```
Switch# sh parser macro name cisco-desktop
-----
Macro name : cisco-desktop
Macro type : default interface
# macro keywords $access_vlan
# Basic interface - Enable data VLAN only
# Recommended value for access vlan should not be 1
switchport access vlan $access_vlan
switchport mode access
# Enable port security limiting port to a single
# MAC address -- that of desktop
switchport port-security
switchport port-security maximum 1
# Ensure port-security age is greater than one minute
# and use inactivity timer
switchport port-security violation restrict
switchport port-security aging time 2
switchport port-security aging type inactivity
# Configure port as an edge network port
spanning-tree portfast
spanning-tree bpduguard enable
-----
Switch#
Switch# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)# interface gigabitethernet1/0/4
Switch(config-if)# macro apply cisco-desktop $access_vlan 25
```

## Displaying Macros

**Table 2-6** Commands for Displaying Auto Smartports and Static Smartports Macros

Command	Purpose
<b>show macro auto ?</b>	Displays information about Auto Smartports macros. <ul style="list-style-type: none"> <li>• device: Displays device macro information</li> <li>• event: Displays macro event-related commands</li> <li>• global: Displays global macro information</li> <li>• interface: Displays interface Auto Smartports status</li> </ul>
<b>show parser macro</b>	Displays all static smartports macros.

**Table 2-6** *Commands for Displaying Auto Smartports and Static Smartports Macros (continued)*

Command	Purpose
<b>show parser macro name</b> <i>macro-name</i>	Displays a specific static Smartports macro.
<b>show parser macro brief</b>	Displays the static Smartports macro names.
<b>show parser macro description</b> [interface <i>interface-id</i> ]	Displays the static Smartports macro description for all interfaces or for a specified interface.
<b>show shell</b>	Displays information about Auto Smartports event triggers and macros. <ul style="list-style-type: none"> <li>• data-path: Displays data paths for <i>fetch</i></li> <li>• environment: Displays shell environment information</li> <li>• functions: Displays shell functions information</li> <li>• triggers: Displays shell triggers information</li> </ul>



## CHAPTER 3

# Auto Smartports and Static Smartports Macros CLI Commands

---

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# debug macro

To enable debugging of the Auto Smartports macro activity, use the **debug macro** command in privileged EXEC. Use the **no** form of this command to disable debugging.

```
debug macro {action | all | api | common | detector | policydir | server | xml}
```

```
no debug macro {action | all | api | common | detector | policydir | server | xml}
```

## Syntax Description

<b>action</b>	Displays all action debug messages.
<b>all</b>	Displays all debug messages.
<b>api</b>	Displays all API debug messages.
<b>common</b>	Displays common debug messages.
<b>detector</b>	Displays detector error debug messages.
<b>policydir</b>	Displays policy director debug messages.
<b>server</b>	Displays server debug messages.
<b>xml</b>	Display XML debug messages.

## Command Default

Debugging is disabled.

## Command Modes

Privileged EXEC

## Command History

Release	Modification
12.2(52)SE	This command was introduced on the Catalyst 3750-E, 3750, 3560-E, 3560, 2975, 2960, and 2918 switches.
12.2(53)SE2	This command was introduced on the Catalyst 3750-X and 3560-X switches.

## Usage Guidelines

The **undebug macro** command is the same as the **no debug macro** command.

When you enable debugging on a switch stack, it is enabled only on the stack master. To enable debugging on a stack member, you can start a session from the stack master by using the **session switch-number** privileged EXEC command. Then enter the **debug** command at the command-line prompt of the stack member. You also can use the **remote command stack-member-number LINE** privileged EXEC command on the stack master switch to enable debugging on a member switch without first starting a session.

## Related Commands

Command	Description
<b>show debugging</b>	Displays information about the enabled types of debugging.



# macro

To apply a macro to an interface or to apply and debug a macro on an interface, use the **macro** command in interface configuration mode.

```
macro {apply | trace} macro-name [parameter {value}] [parameter {value}]
[parameter {value}]
```

## Syntax Description

<b>apply</b>	Applies a macro to an interface.
<b>trace</b>	Applies a macro to an interface and then debugs it.
<i>macro-name</i>	Specifies the name of the macro.
<b>parameter value</b>	(Optional) Specifies unique parameter values that are specific to the interface. You can enter up to three keyword-value pairs. Parameter keyword matching is case sensitive. All matching occurrences of the keyword are replaced with the corresponding value.

## Defaults

This command has no default setting.

## Command Modes

Interface configuration

## Command History

Release	Modification
12.1(19)EA1	This command was introduced on Catalyst 3750 and 3560 switches.
12.2(18)SE	The <b>parameter value</b> keywords were added on Catalyst 3750 and 3560 switches.
12.2(25)FX	This command was introduced on Catalyst 2960 switches.
12.2(44)SE	This command was introduced on Catalyst 2918 switches.
12.2(46)EX	This command was introduced on Catalyst 2975 switches.
12.2(35)SE2	This command was introduced on the Catalyst 3750-E and 3560-E switches.
12.2(53)SE2	This command was introduced on the Catalyst 3750-X and 3560-X switches.

## Usage Guidelines

You can use the **macro apply** *macro-name* interface configuration command to apply and show the macros running on an interface.

You can use the **macro trace** *macro-name* interface configuration command to apply and then debug the macro to find any syntax or configuration errors.

If a command fails because of a syntax error or a configuration error when you apply a macro, the macro continues to apply the remaining commands to the interface.

When creating a macro that requires the assignment of unique values, use the **parameter value** keywords to designate values specific to the interface.

Keyword matching is case sensitive. All matching occurrences of the keyword are replaced with the corresponding value. Any full match of a keyword, even if it is part of a larger string, is considered a match and is replaced by the corresponding value.

Some macros might contain keywords that require a parameter value. You can use the **macro apply macro-name ?** command to display a list of any required values in the macro. If you apply a macro without entering the keyword values, the commands are invalid and are not applied.

There are Cisco-default Smartports macros embedded in the switch software. You can display these macros and the commands that they contain by using the **show parser macro** user EXEC command.

Follow these guidelines when you apply a Cisco-default Smartports macro on an interface:

- Display all macros on the switch by using the **show parser macro** user EXEC command. Display the contents of a specific macro by using the **show parser macro name macro-name** user EXEC command.
- Keywords that begin with \$ mean that a unique parameter value is required. Append the Cisco-default macro with the required values by using the **parameter value** keywords.

The Cisco-default macros use the \$ character to identify required keywords. You can use the \$ character to define keywords when you create a macro.

When you apply a macro to an interface, the macro name is automatically added to the interface. You can display the applied commands and macro names by using the **show running-config interface interface-id** user EXEC command.

A macro applied to an interface range behaves the same way as a macro applied to a single interface. When you use an interface range, the macro is applied sequentially to each interface within the range. If a macro command fails on one interface, it is still applied to the remaining interfaces.

You can delete a macro-applied configuration on an interface by entering the **default interface interface-id** interface configuration command.

## Examples

After you use the **macro name** global configuration command, you can apply it to an interface. This example shows how to apply a user-created macro called *duplex* to an interface:

```
Switch(config-if)# macro apply duplex
```

To debug a macro, use the **macro trace** interface configuration command to find any syntax or configuration errors in the macro as it is applied to an interface.

```
Switch(config-if)# macro trace duplex
Applying command...`duplex auto`
%Error Unknown error.
Applying command...`speed nonegotiate`
```

This example shows how to display the Cisco-default *cisco-desktop* macro and how to apply the macro and set the access VLAN ID to 25 on an interface:

```
Switch# show parser macro cisco-desktop
-----
Macro name : cisco-desktop
Macro type : default

# Basic interface - Enable data VLAN only
# Recommended value for access vlan (AVID) should not be 1
switchport access vlan $AVID
switchport mode access

# Enable port security limiting port to a single
# MAC address -- that of desktop
```

```

switchport port-security
switchport port-security maximum 1

# Ensure port-security age is greater than one minute
# and use inactivity timer
switchport port-security violation restrict
switchport port-security aging time 2
switchport port-security aging type inactivity

# Configure port as an edge network port
spanning-tree portfast
spanning-tree bpduguard enable
-----
Switch#
Switch# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)# interface gigabitethernet1/0/4
Switch(config-if)# macro apply cisco-desktop $AVID 25

```

**Related Commands**

<b>Command</b>	<b>Description</b>
<b>macro description</b>	Adds a description about the macros that are applied to an interface. This is a mandatory command for auto smartports to work.
<b>macro global</b>	Applies a macro on a switch or applies and traces a macro on a switch.
<b>macro global description</b>	Adds a description about the macros that are applied to the switch.
<b>show parser macro</b>	Displays the macro definition for all macros or for the specified macro.

## macro auto

To configure and apply a global macro, use the **macro auto** command in privileged EXEC mode. Use the **no** form of this command to return to the default setting.

Using the CLI:

```
macro auto { apply | config } macro-name
```

Using the Cisco IOS shell scripting capability:

```
macro auto apply macro-name
```

```
macro auto config macro-name [parameter=value [parameter=value] ...]
```

### Syntax Description

<b>apply</b>	Applies the macro.
<b>config</b>	Enters the macro parameters.
<i>macro-name</i>	Specifies the macro name.
<i>parameter=value</i> [ <i>parameter=value</i> ] ...	<i>parameter=value</i> —Replaces values for global macro parameter values. Enter values in the form of name value pair separated by a space: <name1>=<value1> [<name2>=<value2>...].

### Command Default

No macros are applied to the switch.

### Command Modes

Privileged EXEC

### Command History

Release	Modification
12.2(55)SE	This command was introduced on the Catalyst 3750-X, 3750-E, 3750, 3560-X, 3560-E, 3560, 2975, 2960, and 2918 switches.

### Usage Guidelines

To remove the macro from the switch, enter the **no** forms of the macro commands.

If you enter the **macro auto config** *macro-name* command, you are prompted to enter values for all the macro parameters.

Use the exact text string when entering the *macro-name* and *parameters*. The entries are case sensitive.

The user-defined values appear only in the **show macro auto** or **show running-config** command output.

### Examples

To display global macros:

```
Switch# macro auto apply ?
  CISCO_SWITCH_AAA_ACCOUNTING      Configure aaa accounting parameters
  CISCO_SWITCH_AAA_AUTHENTICATION  Configure aaa authentication parameters
  CISCO_SWITCH_AAA_AUTHORIZATION   Configure aaa authorization parameters
  CISCO_SWITCH_AUTO_IP_CONFIG      Configure the ip parameters
```

```

CISCO_SWITCH_AUTO_PCI_CONFIG          Configure PCI compliant parameters
CISCO_SWITCH_DOMAIN_NAME_CONFIG       Configure domain name
CISCO_SWITCH_ETHERCHANNEL_CONFIG      Configure the etherchannel parameters
CISCO_SWITCH_HOSTNAME_CONFIG          Configure hostname
CISCO_SWITCH_HTTP_SERVER_CONFIG        Configure http server
CISCO_SWITCH_LOGGING_SERVER_CONFIG    Configure logging server
CISCO_SWITCH_MGMT_VLAN_CONFIG         Configure management vlan parameters
CISCO_SWITCH_NAME_SERVER_CONFIG        Configure name server parameters
CISCO_SWITCH_NTP_SERVER_CONFIG         Configure NTP server
CISCO_SWITCH_RADIUS_SERVER_CONFIG      Configure radius server
CISCO_SWITCH_SETUP_SNMP_TRAPS         Configure SNMP trap parameters
CISCO_SWITCH_SETUP_USR_CONFIG         Configure the user parameters
CISCO_SWITCH_SNMP_SOURCE_CONFIG        Configure snmp source interface
CISCO_SWITCH_TACACS_SERVER_CONFIG      Configure tacacs server
CISCO_SWITCH_USER_PASS_CONFIG          Configure username and password

```

Switch# **macro auto config ?**

```

CISCO_SWITCH_AAA_ACCOUNTING           Configure aaa accounting parameters
CISCO_SWITCH_AAA_AUTHENTICATION       Configure aaa authentication parameters
CISCO_SWITCH_AAA_AUTHORIZATION        Configure aaa authorization parameters
CISCO_SWITCH_AUTO_IP_CONFIG           Configure the ip parameters
CISCO_SWITCH_AUTO_PCI_CONFIG          Configure PCI compliant parameters
CISCO_SWITCH_DOMAIN_NAME_CONFIG       Configure domain name
CISCO_SWITCH_ETHERCHANNEL_CONFIG      Configure the etherchannel parameters
CISCO_SWITCH_HOSTNAME_CONFIG          Configure hostname
CISCO_SWITCH_HTTP_SERVER_CONFIG        Configure http server
CISCO_SWITCH_LOGGING_SERVER_CONFIG    Configure logging server
CISCO_SWITCH_MGMT_VLAN_CONFIG         Configure management vlan parameters
CISCO_SWITCH_NAME_SERVER_CONFIG        Configure name server parameters
CISCO_SWITCH_NTP_SERVER_CONFIG         Configure NTP server
CISCO_SWITCH_RADIUS_SERVER_CONFIG      Configure radius server
CISCO_SWITCH_SETUP_SNMP_TRAPS         Configure SNMP trap parameters
CISCO_SWITCH_SETUP_USR_CONFIG         Configure the user parameters
CISCO_SWITCH_SNMP_SOURCE_CONFIG        Configure snmp source interface
CISCO_SWITCH_TACACS_SERVER_CONFIG      Configure tacacs server
CISCO_SWITCH_USER_PASS_CONFIG          Configure username and password

```

To display the parameters for a specific macro:

Switch# **macro auto config CISCO\_SWITCH\_AUTO\_IP\_CONFIG ?**

```

CISCO_SWITCH_DOMAIN_NAME_CONFIG       domain name parameters
CISCO_SWITCH_LOGGING_SERVER_CONFIG    logging host parameters
CISCO_SWITCH_NAME_SERVER_CONFIG        name server parameters
CISCO_SWITCH_NTP_SERVER_CONFIG         ntp server parameters
LINE                                   Provide parameters of form [Parameters
                                     name=value]
<cr>

```

Switch# **macro auto config CISCO\_SWITCH\_AUTO\_PCI\_CONFIG ?**

```

CISCO_SWITCH_AAA_ACCOUNTING           aaa accounting parameters
CISCO_SWITCH_AAA_AUTHENTICATION       aaa authentication parameters
CISCO_SWITCH_AAA_AUTHORIZATION        aaa authorization parameters
CISCO_SWITCH_HTTP_SERVER_CONFIG        http server parameters
CISCO_SWITCH_RADIUS_SERVER_CONFIG      radius server parameters
CISCO_SWITCH_TACACS_SERVER_CONFIG      tacacs server parameters
LINE                                   Provide parameters of form [Parameters
                                     name=value]
<cr>

```

Switch# **macro auto config CISCO\_SWITCH\_SETUP\_SNMP\_TRAPS ?**

```

CISCO_SWITCH_SNMP_SOURCE_CONFIG        snmp source parameters
LINE                                   Provide parameters of form [Parameters
                                     name=value]
<cr>

```

```
Switch# macro auto config CISCO_SWITCH_SETUP_USR_CONFIG ?
  CISCO_AUTO_TIMEZONE_CONFIG    timezone parameters
  CISCO_SWITCH_HOSTNAME_CONFIG  hostname parameter
  LINE                           Provide parameters of form [Parameters
                                name=value]

<cr>
```

To set macro parameters and apply the macro using the CLI:

```
Switch# macro auto config CISCO_SWITCH_ETHERCHANNEL_CONFIG
Enter the port channel id[1-48] for 3K & 2350, [1-6] for 2K: 2
Enter the port channel type, Layer:[2-3(L3 not supported on 2K)]: 2
Enter etherchannel mode for the interface[auto/desirable/on/active/passive]: active
Enter the channel protocol[lacp/none]: lacp
Enter the number of interfaces to join the etherchannel[8-PAGP/MODE:ON,16-LACP]: 7
Enter interface name[GigabitEthernet3/0/3]: gigabitethernet1/0/1
Enter interface name[GigabitEthernet3/0/3]: gigabitethernet1/0/2
Enter interface name[GigabitEthernet3/0/3]: gigabitethernet1/0/3
Enter interface name[GigabitEthernet3/0/3]: gigabitethernet1/0/4
Enter interface name[GigabitEthernet3/0/3]: gigabitethernet1/0/5
Enter interface name[GigabitEthernet3/0/3]: gigabitethernet1/0/6
Enter interface name[GigabitEthernet3/0/3]: gigabitethernet1/0/7
Do you want to apply the parameters? [yes/no]: yes
Enter configuration commands, one per line. End with CNTL/Z.
Enter configuration commands, one per line. End with CNTL/Z.
Enter configuration commands, one per line. End with CNTL/Z.
Enter configuration commands, one per line. End with CNTL/Z.
Enter configuration commands, one per line. End with CNTL/Z.
Enter configuration commands, one per line. End with CNTL/Z.
Enter configuration commands, one per line. End with CNTL/Z.
Switch# macro auto apply CISCO_SWITCH_ETHERCHANNEL_CONFIG
Enter configuration commands, one per line. End with CNTL/Z.
Switch#
```

You can also use the Cisco IOS shell scripting capability to set the parameters. For examples, see the “Configuring and Applying Global Macros” section in the “Configuring Auto Smartports and Static Smartports Macros” chapter.

#### Related Commands

Command	Description
<b>macro auto execute</b>	Configures mapping from an event trigger to a built-in macro.
<b>macro auto global processing</b>	Enables Auto Smartports on a switch.
<b>show macro auto</b>	Displays information about macros.
<b>show shell</b>	Displays information about event triggers and macros.

# macro auto control

To specify when the switch applies an Auto Smartports macro based on the detection method, device type, or trigger (referred to as event trigger control), use the **macro auto control** command in interface configuration mode. Use the **no** form of this command to disable trigger-to-macro mapping. The switch then does not apply macros based on event triggers.

```
macro auto control { detection [cdp] [lldp] [mac-address] | device [access-point] [ip-camera]
[lightweight-ap] [media-player] [phone] [router] [switch] | trigger [last-resort]}
```

```
no macro auto control { detection [cdp] [lldp] [mac-address] | device [access-point] [ip-camera]
[lightweight-ap] [media-player] [phone] [router] [switch] | trigger [last-resort]}
```

Syntax Description	
<b>detection</b> [cdp] [lldp] [mac-address]	<b>detection</b> —Sets one or more of these as an event trigger: <ul style="list-style-type: none"> <li>(Optional) <b>cdp</b>—CDP messages</li> <li>(Optional) <b>lldp</b>—LLDP messages</li> <li>(Optional) <b>mac-address</b>—User-defined MAC address groups</li> </ul>
<b>device</b> [access-point] [ip-camera] [lightweight-ap] [media-player] [phone] [router] [switch]	<b>device</b> —Sets one or more of these devices as an event trigger: <ul style="list-style-type: none"> <li>(Optional) <b>access-point</b>—Autonomous access point</li> <li>(Optional) <b>ip-camera</b>—Cisco IP video surveillance camera</li> <li>(Optional) <b>lightweight-ap</b>—Lightweight access point</li> <li>(Optional) <b>media-player</b>—Digital media player</li> <li>(Optional) <b>phone</b>—Cisco IP phone</li> <li>(Optional) <b>router</b>—Cisco router</li> <li>(Optional) <b>switch</b>—Cisco switch</li> </ul>
<b>trigger</b> [last-resort]	<b>trigger</b> —Sets a specific event trigger. <ul style="list-style-type: none"> <li>(Optional) <b>last-resort</b>—Last-resort trigger.</li> </ul>

Command Default	
	The switch uses the device type as the event trigger. If the switch cannot determine the device type, it uses MAC address groups, MAB messages, 802.1x authentication messages, and LLDP messages in random order.

Command Modes	
	Interface configuration

Command History	Release	Modification
	12.2(55)SE	This command was introduced on the Catalyst 3750-X, 3750-E, 3750, 3560-X, 3560-E, 3560, 2975, 2960, and 2918 switches.

**Usage Guidelines**

If you do not set event triggers, the switch uses the device type as the event trigger. If the switch cannot determine the device type, it uses MAC address groups, MAB messages, 802.1x authentication messages, and LLDP messages in random order.

To verify that a macro is applied to an interface, use the **show macro auto interface** user EXEC command.

**Examples**

To set LLDP messages and MAC address groups as event triggers:

```
Switch# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)# interface gigabitethernet 5/0/2
Switch(config-if)# macro auto control detection lldp mac-address
Switch(config-if)# exit
Switch(config)# end
```

To set access points, video surveillance cameras, and digital media players as event triggers:

```
Switch# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)# interface gigabitethernet 5/0/1
Switch(config-if)# macro auto control device access-point ip-camera media-player
Switch(config-if)# exit
Switch(config)# end
```

The switch applies a built-in macro only when it detects an access point, video surveillance camera, or digital media player.

**Related Commands**

Command	Description
<b>macro auto execute</b>	Configures mapping from an event trigger to a built-in macro.
<b>macro auto global processing</b>	Enables Auto Smartports on a switch.
<b>macro auto mac-address-group</b>	Configures MAC address groups.
<b>macro auto sticky</b>	Configures macro persistence.
<b>shell trigger</b>	Creates event triggers.
<b>show macro auto</b>	Displays information about macros.
<b>show shell</b>	Displays information about event triggers and macros.



# macro auto device

To replace macro default parameter values with values that are specific to your switch, use the **macro auto device** command in global configuration mode. Use the **no** form of this command to remove the parameter values.

```
macro auto device {access-point | ip-camera | lightweight-ap | media-player | phone | router |
switch} [parameter=value]
```

```
no macro auto device {access-point | ip-camera | lightweight-ap | media-player | phone | router
| switch} [parameter=value]
```

Syntax Description		
<b>access-point</b>		Replaces the access-point default parameter value: NATIVE_VLAN=1
<b>ip-camera</b>		Replaces the IP video surveillance camera default parameter value: ACCESS_VLAN=1
<b>lightweight-ap</b>		Replaces the lightweight access point default parameter value: ACCESS_VLAN=1
<b>media-player</b>		Replaces the digital media player default parameter value: ACCESS_VLAN=1
<b>phone</b>		Replaces the IP phone default parameter values: ACCESS_VLAN=1 VOICE_VLAN=2
<b>router</b>		Replaces the router default parameter value: NATIVE_VLAN=1
<b>switch</b>		Replaces the switch default parameter value: NATIVE_VLAN=1
<i>parameter=value</i>		(Optional) Replaces the macro default parameter values. Enter new values in the form of name value pair separated by spaces: [<name1>=<value1> <name2>=<value2>...]

**Command Default** Macro default parameter values are defined previously.

**Command Modes** Global configuration

Command History	Release	Modification
	12.2(52)SE	This command was introduced on the Catalyst 3750-E, 3750, 3560-E, 3560, 2975, 2960, and 2918 switches.
	12.2(53)SE2	This command was introduced on the Catalyst 3750-X and 3560-X switches.

**Usage Guidelines** Use the **macro auto device** global configuration command to replace macro default parameter values with values that are specific to your switch. Use the **no** form of this command to remove the parameter values.

Use the **show macro device** privileged EXEC command to display the contents of the macros. Use the *parameter=value* keywords to replace default parameter values within a specific macro.

You can also use the **macro auto execute** global configuration command to specify default parameter values. This command also requires that you specify an event trigger and a built-in or user-defined macro. If you enable both the **macro auto device** and the **macro auto execute** commands, the parameters specified in the command last executed is applied to the switch. Only one command is active on the switch.

To verify that a macro is applied to an interface, use the **show macro auto interface** user EXEC command.

### Examples

This example shows how to display the IP phone macro parameter values, enable the IP phone macro, and change the default voice VLAN to 20:

```
Switch# show macro auto device phone
Device:phone
Default Macro:CISCO_PHONE_AUTO_SMARTPORT
Current Macro:CISCO_PHONE_AUTO_SMARTPORT
Configurable Parameters:ACCESS_VLAN VOICE_VLAN
Defaults Parameters:ACCESS_VLAN=1 VOICE_VLAN=2
Current Parameters:ACCESS_VLAN=1 VOICE_VLAN=2

Switch# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)# macro auto device phone VOICE_VLAN=20
Switch(config)# end
Switch# show macro auto device phone
Device:phone
Default Macro:CISCO_PHONE_AUTO_SMARTPORT
Current Macro:CISCO_PHONE_AUTO_SMARTPORT
Configurable Parameters:ACCESS_VLAN VOICE_VLAN
Defaults Parameters:ACCESS_VLAN=1 VOICE_VLAN=2
Current Parameters:VOICE_VLAN=20
```

### Related Commands

Command	Description
<b>macro auto execute</b>	Configures mapping from an event trigger to a built-in macro.
<b>macro auto global processing</b>	Enables Auto Smartports on a switch.
<b>macro auto mac-address-group</b>	Configures MAC address groups.
<b>macro auto sticky</b>	Configures macro persistence.
<b>shell trigger</b>	Creates event triggers.
<b>show macro auto</b>	Displays information about macros.
<b>show shell</b>	Displays information about event triggers and macros.

## macro auto execute

To replace built-in macro default values and to configure mapping from an event trigger to a built-in or user-defined macro, use the **macro auto execute** command in global configuration mode.

```
macro auto execute event trigger {[builtin built-in macro name] | [remote url]} [parameter=value]
```

```
macro auto execute event trigger [parameter=value] [{ function contents }]
```

```
no macro auto execute event trigger {[builtin built-in macro name] | [remote url]}  
[parameter=value]
```

```
no macro auto execute event trigger [parameter=value] [{ function contents }]
```

### Syntax Description

<i>event trigger</i>	<p>Defines mapping from an event trigger to a built-in macro.</p> <p>Specifies an <i>event trigger</i>:</p> <ul style="list-style-type: none"> <li>• CISCO_CUSTOM_EVENT</li> <li>• CISCO_DMP_EVENT</li> <li>• CISCO_IPVSC_EVENT</li> <li>• CISCO_LAST_RESORT_EVENT</li> <li>• CISCO_PHONE_EVENT</li> <li>• CISCO_ROUTER_EVENT</li> <li>• CISCO_SWITCH_EVENT</li> <li>• CISCO_WIRELESS_AP_EVENT</li> <li>• CISCO_WIRELESS_LIGHTWEIGHT_AP_EVENT</li> <li>• WORD—Apply a user-defined event trigger such as a MAC address group.</li> </ul>
<b>builtin</b> <i>built-in macro name</i>	<p>(Optional) Specifies a <b>builtin</b> <i>built-in macro name</i>:</p> <ul style="list-style-type: none"> <li>• CISCO_AP_AUTO_SMARTPORT Specify the parameter value: NATIVE_VLAN=1.</li> <li>• CISCO_DMP_AUTO_SMARTPORT Specify the parameter value: ACCESS_VLAN=1.</li> <li>• CISCO_IPVSC_AUTO_SMARTPORT Specify the parameter value: ACCESS_VLAN=1.</li> <li>• CISCO_LWAP_AUTO_SMARTPORT Specify the parameter value: ACCESS_VLAN=1.</li> <li>• CISCO_PHONE_AUTO_SMARTPORT Specify the parameter values: ACCESS_VLAN=1 and VOICE_VLAN=2.</li> <li>• CISCO_ROUTER_AUTO_SMARTPORT Specify the parameter value: NATIVE_VLAN=1.</li> <li>• CISCO_SWITCH_AUTO_SMARTPORT Specify the parameter value: NATIVE_VLAN=1.</li> </ul>

<i>parameter=value</i>	(Optional) <i>parameter=value</i> —Replaces default values for parameter values shown for the <i>builtin-macro name</i> , for example, ACCESS_VLAN=1. Enter new values in the form of name value pair separated by a space: [ <i>&lt;name1&gt;=&lt;value1&gt; &lt;name2&gt;=&lt;value2&gt;...</i> ].
{ <i>function contents</i> }	(Optional) { <i>function contents</i> } Specifies a user-defined macro to associate with the trigger. Enter the macro contents within braces. Begin the Cisco IOS shell commands with the left brace and end the command grouping with the right brace.
<b>remote url</b>	(Optional) Specifies a remote server location: <ul style="list-style-type: none"> <li>• The syntax for the local flash file system on the standalone switch or the stack master: <b>flash:</b></li> <li>• The syntax for the local flash file system on a stack member: <b>flash member number:</b></li> <li>• The syntax for the FTP: <b>ftp:[[/username[:password]@location]/directory]/filename</b></li> <li>• The syntax for an HTTP server: <b>http://[[username:password]@]{hostname   host-ip}[/directory]/filename</b></li> <li>• The syntax for a secure HTTP server: <b>https://[[username:password]@]{hostname   host-ip}[/directory]/filename</b></li> <li>• The syntax for the NVRAM: <b>nvrाम://[[username:password]@][[/directory]/filename</b></li> <li>• The syntax for the Remote Copy Protocol (RCP): <b>rcp:[[/username@location]/directory]/filename</b></li> <li>• The syntax for the Secure Copy Protocol (SCP): <b>scp:[[/username@location]/directory]/filename</b></li> <li>• The syntax for the TFTP: <b>tftp:[[/location]/directory]/filename</b></li> </ul>

**Defaults**

This command has no default setting.

**Command Modes**

Global configuration

**Command History**

Release	Modification
12.2(50)SE	This command was introduced on the Catalyst 3750-E, 3750, 3560-E, 3560, 2960, and 2918 switches. It replaced the <b>macro name</b> global configuration command.
12.2(52)SE	The <b>remote</b> keyword and <i>url</i> argument were added on the Catalyst 3750-E, 3750, 3560-E, 3560, 2960, and 2918 switches.  The command was introduced on Catalyst 2975 switches.
12.2(53)SE2	This command was introduced on the Catalyst 3750-X and 3560-X switches.

**Usage Guidelines**

Use the **macro auto execute** global configuration command to replace the built-in macro default values with values that are specific to your switch.

The switch automatically maps from event triggers to built-in macros. The built-in macros are system-defined macros in the software image. You can also create user-defined macros by using the Cisco IOS shell scripting capability.

You can create new event triggers by using the **shell trigger** global configuration commands. Use the **show shell triggers** privileged EXEC command to display the contents of the user-defined triggers and macros.

You can use the **macro auto mac-address-group** global configuration command to create event triggers for devices that do not support Cisco Discovery Protocol (CDP) or Link Layer Discovery Protocol (LLDP).

You can use the remote macro feature to store macros in a central location for designated network switches to use. You can then maintain and update the macro files for use by multiple switches. Use **remote url** to configure the remote server location and macro path information. There are no specific file extension requirements for saved macro files.

Auto Smartports macros and antimacros (the antimacro is the portion of the applied macro that removes it at link down) have these guidelines and limitations:

- You can delete or change the built-in macros. However, you can override a built-in macro by creating a user-defined macro with the same name. To restore the original built-in macro, delete the user-defined macro.
- If you enable both the **macro auto device** and the **macro auto execute** global configuration commands, the parameters specified in the command last executed are applied to the switch. Only one command is active on the switch.
- To avoid system conflicts when macros are applied, remove all port configurations except for 802.1x authentication.
- Do not configure port security when enabling Auto Smartports on the switch.
- If the macro conflicts with the original configuration, either the macro does not apply some of the original configuration commands, or the antimacro does not remove them. (The antimacro is the portion of the applied macro that removes the macro at a link-down event.)

For example, if 802.1x authentication is enabled, you cannot remove the switchport-mode access configuration. Remove the 802.1x authentication before removing the switchport mode configuration.

- A port cannot be a member of an EtherChannel when you apply Auto Smartports macros.
- The built-in-macro default data VLAN is VLAN 1. The default voice VLAN is VLAN 2. If your switch uses different access, native, or voice VLANs, use the **macro auto device** or the **macro auto execute** global configuration commands to configure the values.
- For 802.1x authentication or MAC authentication bypass (MAB), to detect non-Cisco devices, configure the RADIUS server to support the Cisco attribute-value pair **auto-smart-port=event trigger**.
- The switch supports Auto Smartport macros only on directly connected devices. Multiple device connections, such as hubs, are not supported.
- If authentication is enabled on a port, the switch ignores a MAC address trigger if authentication fails.
- The order of CLI commands within the macro and the corresponding antimacro can be different.

**Examples**

This example shows how to use two built-in macros for connecting Cisco switches and Cisco IP phones to the switch. This example modifies the default voice VLAN, access VLAN, and native VLAN for the trunk interface:

```
Switch# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)#!!! the next command modifies the access and voice vlans
Switch(config)#!!! for the built in Cisco IP phone auto smartport macro
Switch(config)# macro auto execute CISCO_PHONE_EVENT builtin CISCO_PHONE_AUTO_SMARTPORT
ACCESS_VLAN=10 VOICE_VLAN=20
Switch(config)#
Switch(config)#!!! the next command modifies the Native vlan used for inter switch trunks
Switch(config)# macro auto execute CISCO_SWITCH_EVENT builtin CISCO_SWITCH_AUTO_SMARTPORT
NATIVE_VLAN=10
Switch(config)#
Switch(config)#!!! the next command enables auto smart ports globally and also enables
fallback to CDP event trigger when dot1x or mab authentication fails on the device
interface
Switch(config)# macro auto global processing fallback cdp
Switch(config)#
Switch(config)# exit

Switch# !!! here is the running configuration of the interface connected
Switch# !!! to another Cisco Switch after the Macro is applied
Switch#
Switch# show running-config interface gigabitethernet1/0/1
Building configuration...

Current configuration : 284 bytes
!
interface GigabitEthernet1/0/1
 switchport trunk encapsulation dot1q
 switchport trunk native vlan 10
 switchport mode trunk
 srr-queue bandwidth share 10 10 60 20
 queue-set 2
 priority-queue out
 mls qos trust cos
 auto qos voip trust
 macro description CISCO_SWITCH_EVENT
end
```

This example shows how to map a user-defined event trigger called media player to a user-defined macro.

- a. Connect the media player to an 802.1x- or MAB-enabled switch port.
- b. On the RADIUS server, set the attribute-value pair to **auto-smart-port=MP\_EVENT**.
- c. On the switch, create the event trigger MP\_EVENT, and enter the user-defined macro commands.
- d. The switch recognizes the attribute-value pair=MP\_EVENT response from the RADIUS server and applies the macro associated with this event trigger.

```
Switch(config)# shell trigger MP_EVENT mediaplayer
Switch(config)# macro auto execute MP_EVENT {
if [[ $LINKUP -eq YES ]]; then
conf t
interface $INTERFACE
macro description $TRIGGER
switchport access vlan 1
switchport mode access
switchport port-security
switchport port-security maximum 1
```

```

switchport port-security violation restrict
switchport port-security aging time 2
switchport port-security aging type inactivity
spanning-tree portfast
spanning-tree bpduguard enable
exit
fi
if [[ $LINKUP -eq NO ]]; then
conf t
interface $INTERFACE
no macro description $TRIGGER
no switchport access vlan 1
if [[ $AUTH_ENABLED -eq NO ]]; then
no switchport mode access
fi
no switchport port-security
no switchport port-security maximum 1
no switchport port-security violation restrict
no switchport port-security aging time 2
no switchport port-security aging type inactivity
no spanning-tree portfast
no spanning-tree bpduguard enable
exit
fi

```

**Table 3-1** Supported Cisco IOS Shell Keywords

Command	Description
{	Begin the command grouping.
}	End the command grouping.
[[	Use as a conditional construct.
]]	Use as a conditional construct.
else	Use as a conditional construct.
-eq	Use as a conditional construct.
fi	Use as a conditional construct.
if	Use as a conditional construct.
then	Use as a conditional construct.
-z	Use as a conditional construct.
\$	Variables that begin with the \$ character are replaced with a parameter value.
#	Use the # character to enter comment text.

**Table 3-2** *Unsupported Cisco IOS Shell Reserved Keywords*

<b>Command</b>	<b>Description</b>
	Pipeline.
case	Conditional construct.
esac	Conditional construct.
for	Looping construct.
function	Shell function.
in	Conditional construct.
select	Conditional construct.
time	Pipeline.
until	Looping construct.
while	Looping construct.

**Related Commands**

<b>Command</b>	<b>Description</b>
<b>macro auto device</b>	Configures macro default parameter values.
<b>macro auto global processing</b>	Enables Auto Smartports on a switch.
<b>macro auto mac-address-group</b>	Configures MAC address groups.
<b>macro auto sticky</b>	Configures macro persistence.
<b>shell trigger</b>	Creates event triggers.
<b>show macro auto</b>	Displays information about macros.
<b>show shell</b>	Displays information about event triggers and macros.



# macro auto file

To deregister the Cisco IOS shell scripts and to register user-defined scripts, use the **macro auto file** command in global configuration mode. Use the **no** form of this command to remove the registration of system-defined scripts from the policy engine.

```
macro auto file {directory word} | {register word type [system | user]}
```

```
no macro auto file {directory word} | {register word type [system | user]}
```

## Syntax Description

<b>directory</b> <i>word</i>	Specifies the auto execution user file directory path.
<b>register</b> <i>word type</i>	Specifies the name and type of the file to register.
<b>system</b>	(Optional) Searches for a system policy file.
<b>user</b>	(Optional) Searches for a user policy file.

## Defaults

There is no default.

## Command Modes

Global configuration

## Command History

Release	Modification
12.2(52)SE	This command was introduced on the Catalyst 3750-E, 3750, 3560-E, 3560, 2975, 2960, and 2918 switches.
12.2(53)SE2	This command was introduced on the Catalyst 3750-X and 3560-X switches.

## Usage Guidelines

Use the **macro auto file** global configuration command to deregister the Cisco IOS shell scripts and to register user-defined scripts.

## Examples

This example shows how to deregister the system-defined file *Mandatory.cdp.sh*, copy the user-defined script to flash, register the location of the user-defined file, register the file *Mandatory.cdp.sh*, and how to verify your entries:

```
Switch# directory flash:
Directory of flash:/

   3  -rwx          3533   Mar 1 1993 00:02:26 +00:00  Mandatory.cdp.sh

Switch(config)# no macro auto file register Mandatory.cdp.sh
Switch(config)# macro auto file directory "flash:"
Switch(config)# macro auto file register Mandatory.cdp.sh type user
Switch(config)# end
Switch# show running config | inc macro

macro auto file directory "flash:/"
macro auto file register Mandatory.cdp.sh type user
```

For ASP EEM registers the following policy scripts:

```
Mandatory.cdp.sh      Mandatory.link.sh      Mandatory.lldp.sh
Mandatory.identity.sh Mandatory.link2.sh      Mandatory.mat.sh
```

Related Commands	Command	Description
	<b>macro auto global processing</b>	Enables Auto Smartports on a switch.
	<b>shell trigger</b>	Creates event triggers.
	<b>show macro auto</b>	Displays information about macros.
	<b>show shell</b>	Displays information about event triggers and macros.

# macro auto global control

To specify when the switch applies an Auto Smartports macro based on the detection method, device type, or trigger (referred to as event trigger control), use the **macro auto global control** command in global configuration mode. Use the **no** form of this command to disable trigger-to-macro mapping. The switch then does not apply macros based on event triggers.

```
macro auto global control { detection [cdp] [lldp] [mac-address] | device [access-point]
[ip-camera] [lightweight-ap] [media-player] [phone] [router] [switch] | trigger
[last-resort]}
```

```
no macro auto global control { detection [cdp] [lldp] [mac-address] | device [access-point]
[ip-camera] [lightweight-ap] [media-player] [phone] [router] [switch] | trigger
[last-resort]}
```

## Syntax Description

<b>detection</b> [cdp] [lldp] [mac-address]	<b>detection</b> —Sets one or more of these as an event trigger: <ul style="list-style-type: none"> <li>(Optional) <b>cdp</b>—CDP messages</li> <li>(Optional) <b>lldp</b>—LLDP messages</li> <li>(Optional) <b>mac-address</b>—User-defined MAC address groups</li> </ul>
<b>device</b> [access-point] [ip-camera] [lightweight-ap] [media-player] [phone] [router] [switch]	<b>device</b> —Sets one or more of these devices as an event trigger: <ul style="list-style-type: none"> <li>(Optional) <b>access-point</b>—Autonomous access point</li> <li>(Optional) <b>ip-camera</b>—Cisco IP video surveillance camera</li> <li>(Optional) <b>lightweight-ap</b>—Lightweight access point</li> <li>(Optional) <b>media-player</b>—Digital media player</li> <li>(Optional) <b>phone</b>—Cisco IP phone</li> <li>(Optional) <b>router</b>—Cisco router</li> <li>(Optional) <b>switch</b>—Cisco switch</li> </ul>
<b>trigger</b> [last-resort]	<b>trigger</b> —Sets a specific event trigger. <ul style="list-style-type: none"> <li>(Optional) <b>last-resort</b>—Last-resort trigger.</li> </ul>

## Command Default

The switch uses the device type as the event trigger. If the switch cannot determine the device type, it uses MAC address groups, MAB messages, 802.1x authentication messages, and LLDP messages in random order.

## Command Modes

Global configuration

## Command History

Release	Modification
12.2(55)SE	This command was introduced on the Catalyst 3750-X, 3750-E, 3750, 3560-X, 3560-E, 3560, 2975, 2960, and 2918 switches.

**Usage Guidelines**

If you do not set event triggers, the switch uses the device type as the event trigger. If the switch cannot determine the device type, it uses MAC address groups, MAB messages, 802.1x authentication messages, and LLDP messages in random order.

To verify that a macro is applied to a switch, use the **show macro auto global** user EXEC command.

**Examples**

To set CDP messages, LLDP messages and MAC address groups as event triggers:

```
Switch# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)# macro auto global control detection cdp lldp mac-address
Switch(config)# end
```

To set autonomous access points, lightweight access points, and IP phones:

```
Switch# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)# macro auto global control device access-point lightweight-ap phone
Switch(config)# end
```

**Related Commands**

Command	Description
<b>macro auto execute</b>	Configures mapping from an event trigger to a built-in macro.
<b>macro auto global processing</b>	Enables Auto Smartports on a switch.
<b>macro auto mac-address-group</b>	Configures MAC address groups.
<b>macro auto sticky</b>	Configures macro persistence.
<b>shell trigger</b>	Creates event triggers.
<b>show macro auto</b>	Displays information about macros.
<b>show shell</b>	Displays information about event triggers and macros.

# macro auto global processing

To enable Auto Smartports macros on the switch, use the **macro auto global processing** command in global configuration mode. Use the **no** form of this command to disable the macros.

**macro auto global processing [fallback cdp]**

**no macro auto global processing [fallback cdp]**

<b>Syntax Description</b>	<b>fallback cdp</b>	(Optional) Use the Cisco Discovery Protocol (CDP) as the fallback mechanism if authentication fails.
---------------------------	---------------------	------------------------------------------------------------------------------------------------------

<b>Command Default</b>	Auto Smartports is disabled.
------------------------	------------------------------

<b>Command Modes</b>	Global configuration
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<b>Command History</b>	<b>Release</b>	<b>Modification</b>
	12.2(50)SE	This command was introduced on the Catalyst 3750-E, 3750, 3560-E, 3560, 2960, and 2918 switches.
	12.2(52)SE	The command changed from <b>macro auto global processing [cdp-fallback]</b> to <b>macro auto global processing [fallback cdp]</b> on Catalyst 3750-E, 3750, 3560-E, 3560, 2960, and 2918 switches.  The command was introduced on Catalyst 2975 switches.
	12.2(53)SE2	This command was introduced on Catalyst 3750-X and 3560-X switches.

<b>Usage Guidelines</b>	Use the <b>macro auto global processing</b> global configuration command to globally enable macros on the <i>switch</i> . To disable macros on a specific <i>port</i> , use the <b>no macro auto processing</b> command in interface mode.
-------------------------	--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

When using 802.1x or MAB authentication, you need to configure the RADIUS server to support the Cisco attribute-value pair **auto-smart-port=event trigger**. If authentication fails, the macro is not applied. To ensure macro application even if 802.1x or MAB authentication fails, use the **fallback cdp** keywords for the **macro auto global processing** command. If the 802.1x or MAB authentication fails on the interface, the switch uses the fallback CDP event trigger.

When CDP-identified devices advertise multiple capabilities, the switch chooses a capability first by switch and then by router.

To verify that a macro is applied to an interface, use the **show macro auto interface** privileged EXEC command.

**Examples**

This example shows how enable Auto Smartports on the switch and to disable the feature on a specific interface:

```
Switch(config)# macro auto global processing
Switch(config)# interface interface_id
Switch(config-if)# no macro auto processing
```

**Related Commands**

<b>Command</b>	<b>Description</b>
<b>macro auto device</b>	Configures macro default parameter values.
<b>macro auto execute</b>	Configures mapping from an event trigger to a built-in macro.
<b>macro auto mac-address-group</b>	Configures MAC address groups.
<b>macro auto sticky</b>	Configures macro persistence.
<b>shell trigger</b>	Creates event triggers.
<b>show macro auto</b>	Displays information about macros.
<b>show shell</b>	Displays information about event triggers and macros.

## macro auto mac-address-group

To create an event trigger for devices that do not support Cisco Discovery Protocol (CDP) or Link Layer Discover Protocol (LLDP), use the **macro auto mac-address-group** command in global configuration mode. Use the **no** form of this command to delete the group.

```
macro auto mac-address-group name [mac-address list list] | [oui [list list | range start-value size number]]
```

```
no macro auto mac-address-group name [mac-address list list] | [oui [list list | range start-value size number]]
```

### Syntax Description

<i>name</i>	Specifies the group name.
<b>oui</b>	(Optional) Specifies an operationally unique identifier (OUI) <b>list</b> or <b>range</b> . <ul style="list-style-type: none"> <li><b>list</b>—Enter an OUI list in hexadecimal format separated by spaces.</li> <li><b>range</b>—Enter the starting OUI hexadecimal value (<i>start-value</i>).</li> <li><b>size</b>—Enter the length of the range (<i>number</i>) from 1 to 5 to create a list of sequential addresses.</li> </ul>
<b>mac-address list</b> <i>list</i>	(Optional) Configures a list of MAC addresses separated by a space.

### Defaults

No groups are defined.

### Command Modes

Group configuration

### Command History

Release	Modification
12.2(52)SE	This command was introduced on the Catalyst 3750-E, 3750, 3560-E, 3560, 2975, 2960, and 2918 switches.
12.2(53)SE2	This command was introduced on the Catalyst 3750-X and 3560-X switches.

### Usage Guidelines

Use the **macro auto mac-address-group** global configuration command to create an event trigger for devices that do not support CDP or LLDP. Use the MAC address group as a trigger to map to a built-in or user-defined macro by using the **macro auto execute** global configuration command. At link-up the switch detects the device type and applies the specified macro.

The switch supports up to ten MAC address groups. Each group can have up to 32 OUI and 32 MAC configured addresses.

**Examples**

This example shows how to create a MAC-address-group event trigger called *address\_trigger* and how to verify your entries:

```
Switch# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)# macro auto address-group mac address_trigger
Switch(config-addr-grp-mac)# mac-address list 2222.3333.3334 22.33.44 a.b.c
Switch(config-addr-grp-mac)# oui list 455555 233244
Switch(config-addr-grp-mac)# oui range 333333 size 2
Switch(config-addr-grp-mac)# exit
Switch(config)# end
Switch# show running configuration
!
!macro auto mac-address-group address_trigger
  oui list 333334
  oui list 333333
  oui list 233244
  oui list 455555
  mac-address list 000A.000B.000C
  mac-address list 0022.0033.0044
  mac-address list 2222.3333.3334
!
<output truncated>
```

**Related Commands**

Command	Description
<b>macro auto device</b>	Configures macro default parameter values.
<b>macro auto execute</b>	Configures mapping from an event trigger to a built-in macro.
<b>macro auto global processing</b>	Enables Auto Smartports on a switch.
<b>macro auto sticky</b>	Configures macro persistence.
<b>shell trigger</b>	Creates event triggers.
<b>show macro auto</b>	Displays information about macros.
<b>show shell</b>	Displays information about event triggers and macros.



# macro auto sticky

To configure macros remain active after a link-down event, referred to as *macro persistence*, use the **macro auto sticky** command in global configuration command mode. Use the **no** form of this command to disable the macro persistence.

**macro auto sticky**

**no macro auto sticky**

## Syntax Description

This command has no arguments or keywords.

## Defaults

Macro persistence is disabled.

## Command Modes

Global configuration

## Command History

Release	Modification
12.2(52)SE	This command was introduced on the Catalyst 3750-E, 3750, 3560-E, 3560, 2975, 2960, and 2918 switches.
12.2(53)SE2	This command was introduced on the Catalyst 3750-X and 3560-X switches.

## Usage Guidelines

Use the **macro auto sticky** global configuration command so that macros remain active after a link-down event.

## Examples

This example shows how to enable macro persistence on an interface:

```
Switch# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)# interface gigabitethernet 2/0/1
Switch(config-if)# macro auto port sticky
Switch(config-if)# exit
Switch(config)# end
```

## Related Commands

Command	Description
<b>macro auto device</b>	Configures macro default parameter values.
<b>macro auto execute</b>	Configures mapping from an event trigger to a built-in macro.
<b>macro auto global processing</b>	Enables Auto Smartports on a switch.
<b>macro auto mac-address-group</b>	Configures MAC address groups.
<b>shell trigger</b>	Creates event triggers.

<b>Command</b>	<b>Description</b>
<b>show macro auto</b>	Displays information about macros.
<b>show shell</b>	Displays information about event triggers and macros.

# macro description

To enter a description about which macros are applied to an interface, use the **macro description** command in interface configuration mode. Use the **no** form of this command to remove the description.

This command is mandatory for auto smartports to work.

**macro description** *text*

**no macro description** *text*

## Syntax Description

**description** *text* Enters a description about the macros that are applied to the specified interface.

## Defaults

This command has no default setting.

## Command Modes

Interface configuration

## Command History

Release	Modification
12.1(19)EA1	This command was introduced on the Catalyst 3750 and 3560 switches.
12.2(25)FX	This command was introduced on the Catalyst 2960 switches.
12.2(44)SE	This command was introduced on the Catalyst 2918 switches.
12.2(46)EX	This command was introduced on the Catalyst 2975 switches.
12.2(35)SE2	This command was introduced on the Catalyst 3750-E and 3560-E switches.
12.2(53)SE2	This command was introduced on the Catalyst 3750-X and 3560-X switches.

## Usage Guidelines

Use the **description** keyword to associate comment text or the macro name with an interface. When multiple macros are applied on a single interface, the description text is from the last applied macro.

You can verify your settings by entering the **show parser macro description** privileged EXEC command.

## Examples

This example shows how to add a description to an interface:

```
Switch(config-if)# macro description duplex settings
```

## Related Commands

Command	Description
<b>macro apply</b>	Applies a macro on an interface.
<b>macro global</b>	Applies a macro on a switch or applies and traces a macro on a switch
<b>macro global description</b>	Adds a description about the macros that are applied to the switch.
<b>macro trace</b>	Applies and traces a macro on an interface.
<b>show parser macro</b>	Displays the macro definition for all macros or for the specified macro.

# macro global

To apply a macro to a switch or to apply and debug a macro on a switch, use the **macro global** command in global configuration mode.

```
macro global {apply | trace} macro-name [parameter {value}] [parameter {value}]
[parameter {value}]
```

## Syntax Description

<b>apply</b>	Applies a macro to the switch.
<b>trace</b>	Applies a macro to a switch and debugs the macro.
<i>macro-name</i>	Specifies the name of the macro.
<b>parameter value</b>	(Optional) Specifies unique parameter values that are specific to the switch. You can enter up to three keyword-value pairs. Parameter keyword matching is case sensitive. All matching occurrences of the keyword are replaced with the corresponding value.

## Defaults

This command has no default setting.

## Command Modes

Global configuration

## Command History

Release	Modification
12.2(20)SE	This command was introduced on the Catalyst 3750 and 3560 switches.
12.2(25)FX	This command was introduced on the Catalyst 2960 switches.
12.2(44)SE	This command was introduced on the Catalyst 2918 switches.
12.2(46)EX	This command was introduced on the Catalyst 2975 switches.
12.2(35)SE2	This command was introduced on the Catalyst 3750-E and 3560-E switches.
12.2(53)SE2	This command was introduced on the Catalyst 3750-X and 3560-X switches.

## Usage Guidelines

Use the **macro global apply** *macro-name* global configuration command to apply the macro to an interface.

Use the **macro global trace** *macro-name* global configuration command to apply and then debug the macro to find any syntax or configuration errors.

If a command fails when you apply a macro because of a syntax error or a configuration error, the macro continues to apply the remaining commands to the switch.

When creating a macro that requires the assignment of unique values, use the **parameter value** keywords to designate values specific to the switch.

Keyword matching is case sensitive. All matching occurrences of the keyword are replaced with the corresponding value. Any full match of a keyword, even if it is part of a larger string, is considered a match and is replaced by the corresponding value.

Some macros might contain keywords that require a parameter value. You can use the **macro global apply macro-name ?** command to display a list of any required values in the macro. If you apply a macro without entering the keyword values, the commands are invalid and are not applied.

There are Cisco-default Smartports macros embedded in the switch software. You can display these macros and the commands they contain by using the **show parser macro** user EXEC command.

Follow these guidelines when you apply a Cisco-default Smartports macro on a switch:

- Display all macros on the switch by using the **show parser macro** user EXEC command. Display the contents of a specific macro by using the **show parser macro name macro-name** user EXEC command.
- Keywords that begin with \$ mean that a unique parameter value is required. Append the Cisco-default macro with the required values by using the **parameter value** keywords.

The Cisco-default macros use the \$ character to help identify required keywords. There is no restriction on using the \$ character to define keywords when you create a macro.

When you apply a macro to a switch, the macro name is automatically added to the switch. You can display the applied commands and macro names by using the **show running-config** user EXEC command.

You can delete a global macro-applied configuration on a switch only by entering the **no** version of each command in the macro.

## Examples

After you have created a new macro by using the **macro auto execute** global configuration command, you can apply it to a switch. This example shows how to see the **snmp** macro, how to apply the macro, set the hostname to test-server, and set the IP precedence value to 7:

```
Switch# show parser macro name snmp
Macro name : snmp
Macro type : customizable

#enable port security, linkup, and linkdown traps
snmp-server enable traps port-security
snmp-server enable traps linkup
snmp-server enable traps linkdown
#set snmp-server host
snmp-server host ADDRESS
#set SNMP trap notifications precedence
snmp-server ip precedence VALUE

-----
Switch(config)# macro global apply snmp ADDRESS test-server VALUE 7
```

To debug a macro, use the **macro global trace** global configuration command to find any syntax or configuration errors in the macro when you apply it to a switch. In this example, the **ADDRESS** parameter value was not entered, the **snmp-server host** command failed, and the remainder of the macro is applied to the switch:

```
Switch(config)# macro global trace snmp VALUE 7
Applying command...'snmp-server enable traps port-security'
Applying command...'snmp-server enable traps linkup'
Applying command...'snmp-server enable traps linkdown'
Applying command...'snmp-server host'
%Error Unknown error.
Applying command...'snmp-server ip precedence 7'
```

Related Commands	Command	Description
	<b>macro apply</b>	Applies a macro on an interface.
	<b>macro description</b>	Adds a description about the macros that are applied to an interface.
	<b>macro global description</b>	Adds a description about the macros that are applied to the switch.
	<b>macro trace</b>	Applies and traces a macro on an interface.
	<b>show parser macro</b>	Displays the macro definition for all macros or for the specified macro.

# macro global description

To enter a description about the macros that are applied to a switch, use the **macro global description** command in global configuration mode. Use the **no** form of this command to remove the description.

**macro global description** *text*

**no macro global description** *text*

## Syntax Description

**description** *text* Enters a description about the macros that are applied to the switch.

## Defaults

This command has no default setting.

## Command Modes

Global configuration

## Command History

Release	Modification
12.2(20)SE	This command was introduced on the Catalyst 3750 and 3560 switches.
12.2(25)FX	This command was introduced on the Catalyst 2960 switches.
12.2(44)SE	This command was introduced on the Catalyst 2918 switches.
12.2(46)EX	This command was introduced on the Catalyst 2975 switches.
12.2(35)SE2	This command was introduced on the Catalyst 3750-E and 3560-E switches.
12.2(53)SE2	This command was introduced on the Catalyst 3750-X and 3560-X switches.

## Usage Guidelines

Use the **description** keyword to associate comment text or the macro name with a switch. When multiple macros are applied on a switch, the description text is from the last applied macro.

You can verify your settings by entering the **show parser macro description** privileged EXEC command.

## Examples

This example shows how to add a description to a switch:

```
Switch(config)# macro global description uddld aggressive mode enabled
```

## Related Commands

Command	Description
<b>macro apply</b>	Applies a macro on an interface.
<b>macro description</b>	Adds a description about the macros that are applied to an interface.
<b>macro global</b>	Applies a macro on a switch or applies and traces a macro on a switch.
<b>macro trace</b>	Applies and debugs a macro on an interface.
<b>show parser macro</b>	Displays the macro definition for all macros or for the specified macro.

# shell trigger

To create an event trigger, use the **shell trigger** command in global configuration mode. Use the **no** form of this command to delete the trigger.

**shell trigger** *identifier description*

**no shell trigger** *identifier description*

## Syntax Description

<i>identifier</i>	Specifies the event trigger identifier. The identifier should have no spaces or hyphens between words.
<i>description</i>	Specifies the event trigger description text.

## Defaults

System-defined event triggers:

- CISCO\_DMP\_EVENT
- CISCO\_IPVSC\_AUTO\_EVENT
- CISCO\_PHONE\_EVENT
- CISCO\_SWITCH\_EVENT
- CISCO\_ROUTER\_EVENT
- CISCO\_WIRELESS\_AP\_EVENT
- CISCO\_WIRELESS\_LIGHTWEIGHT\_AP\_EVENT

## Command Modes

Global configuration

## Command History

Release	Modification
12.2(50)SE	This command was introduced on the Catalyst 3750-E, 3750, 3560-E, 3560, and 2960 switches.
12.2(52)SE	This command was introduced on the Catalyst 2975 switches.
12.2(53)SE2	This command was introduced on the Catalyst 3750-X and 3560-X switches.

## Usage Guidelines

Use this command to create user-defined event triggers for use with the **macro auto device** and the **macro auto execute** global configuration commands.

To support dynamic device discovery when using IEEE 802.1x authentication, you need to configure the RADIUS authentication server to support the Cisco attribute-value pair: **auto-smart-port=event trigger**.



**Examples**

This example shows how to create a user-defined event trigger called RADIUS\_MAB\_EVENT:

```
Switch# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)# shell trigger RADIUS_MAB_EVENT MAC_AuthBypass Event
Switch(config)# end
```

**Related Commands**

<b>Command</b>	<b>Description</b>
<b>macro auto device</b>	Configures macro default parameter values.
<b>macro auto execute</b>	Configures mapping from an event trigger to a built-in macro.
<b>macro auto global processing</b>	Enables Auto Smartports on a switch.
<b>macro auto mac-address-group</b>	Configures MAC address groups.
<b>macro auto sticky</b>	Configures macro persistence.
<b>shell trigger</b>	Creates event triggers.
<b>show macro auto</b>	Displays information about macros.
<b>show shell</b>	Displays information about event triggers and macros.

## show macro auto

To display Auto Smartports macro information, use the **show macro auto** command in user EXEC mode.

```
show macro auto { address-group [address-group-name] | device [access-point] [ip-camera]
[lightweight-ap] [media-player] [phone] [router] [switch] | event manager | global
[event_trigger] | interface [interface_id] } [{begin | exclude | include} expression]
```

Syntax Description	
<b>address-group</b> [ <i>address-group-name</i> ]	Displays address-group information.  (Optional) <i>address-group-name</i> —Displays information for the specified address group.
<b>device</b> [access-point] [ip-camera] [lightweight-ap] [media-player] [phone] [router] [switch]	Displays device information about one or more devices. <ul style="list-style-type: none"> <li>(Optional) <b>access-point</b>—Autonomous access point</li> <li>(Optional) <b>ip-camera</b>—Cisco IP video surveillance camera</li> <li>(Optional) <b>lightweight-ap</b>—Lightweight access point</li> <li>(Optional) <b>media-player</b>—Digital media player</li> <li>(Optional) <b>phone</b>—Cisco IP phone</li> <li>(Optional) <b>router</b>—Cisco router</li> <li>(Optional) <b>switch</b>—Cisco switch</li> </ul>
<b>event manager</b>	Displays embedded event manager information.
<b>global</b> [ <i>event_trigger</i> ]	Displays Auto Smartports information about the switch.  (Optional) <i>event_trigger</i> —Displays information about the specified event trigger.
<b>interface</b> [ <i>interface_id</i> ]	Displays interface status.  (Optional) <i>interface_id</i> —Displays information about the specified interface.

Command Modes	
	User EXEC

Command History	Release	Modification
	12.2(52)SE	This command was introduced on the Catalyst 3750-E, 3750, 3560-E, 3560, 2975, 2960, and 2918 switches.
	12.2(53)SE2	This command was introduced on the Catalyst 3750-X and 3560-X switches.
	12.2(55)SE	The <b>global</b> keyword was added on the Catalyst 3750-X, 3750-E, 3750, 3560-X, 3560-E, 3560, 2975, 2960, and 2918 switches. The <b>address-group</b> , <b>device</b> , <b>event manager</b> , and <b>interface</b> keywords are not optional.

**Usage Guidelines**

Use this command to display the Auto Smartports information for the switch. Use the **show macro auto device** privileged EXEC command to display the configurable parameters for a device.

Expressions are case sensitive. For example, if you enter **! exclude output**, the lines that contain output do not appear, but the lines that contain Output appear.

**Examples**

This example shows how to use the **show macro auto device** privileged EXEC command to view the configuration on the switch:

```
Switch> show macro auto device
Device:lightweight-ap
Default Macro:CISCO_LWAP_AUTO_SMARTPORT
Current Macro:CISCO_LWAP_AUTO_SMARTPORT
Configurable Parameters:ACCESS_VLAN
Defaults Parameters:ACCESS_VLAN=1
Current Parameters:ACCESS_VLAN=1

Device:access-point
Default Macro:CISCO_AP_AUTO_SMARTPORT
Current Macro:CISCO_AP_AUTO_SMARTPORT
Configurable Parameters:NATIVE_VLAN
Defaults Parameters:NATIVE_VLAN=1
Current Parameters:NATIVE_VLAN=1

Device:phone
Default Macro:CISCO_PHONE_AUTO_SMARTPORT
Current Macro:CISCO_PHONE_AUTO_SMARTPORT
Configurable Parameters:ACCESS_VLAN VOICE_VLAN
Defaults Parameters:ACCESS_VLAN=1 VOICE_VLAN=2
Current Parameters:ACCESS_VLAN=1 VOICE_VLAN=2

Device:router
Default Macro:CISCO_ROUTER_AUTO_SMARTPORT
Current Macro:CISCO_ROUTER_AUTO_SMARTPORT
Configurable Parameters:NATIVE_VLAN
Defaults Parameters:NATIVE_VLAN=1
Current Parameters:NATIVE_VLAN=1

Device:switch
Default Macro:CISCO_SWITCH_AUTO_SMARTPORT
Current Macro:CISCO_SWITCH_AUTO_SMARTPORT
Configurable Parameters:NATIVE_VLAN
Defaults Parameters:NATIVE_VLAN=1
Current Parameters:NATIVE_VLAN=1

Device:ip-camera
Default Macro:CISCO_IP_CAMERA_AUTO_SMARTPORT
Current Macro:CISCO_IP_CAMERA_AUTO_SMARTPORT
Configurable Parameters:ACCESS_VLAN
Defaults Parameters:ACCESS_VLAN=1
Current Parameters:ACCESS_VLAN=1

Device:media-player
Default Macro:CISCO_DMP_AUTO_SMARTPORT
Current Macro:CISCO_DMP_AUTO_SMARTPORT
Configurable Parameters:ACCESS_VLAN
Defaults Parameters:ACCESS_VLAN=1
Current Parameters:ACCESS_VLAN=1
```

This example shows how to use the **show macro auto address-group** *name* privileged EXEC command to view the TEST3 address group configuration on the switch:

```
Switch> show macro auto address-group TEST3
MAC Address Group Configuration:
```

Group Name	OUI	MAC ADDRESS
-----	-----	-----
TEST3	2233.33	0022.0022.0022
	2233.34	

#### Related Commands

Command	Description
<b>macro auto device</b>	Configures macro default parameter values.
<b>macro auto execute</b>	Configures mapping from an event trigger to a built-in macro.
<b>macro auto global processing</b>	Enables Auto Smartports on a switch.
<b>macro auto mac-address-group</b>	Configures MAC address groups.
<b>macro auto sticky</b>	Configures macro persistence.
<b>shell trigger</b>	Creates event triggers.
<b>show shell</b>	Displays information about event triggers and macros.

# show parser macro

To display the parameters for all configured macros or for one macro on the switch, use the **show parser macro** command in user EXEC mode.

```
show parser macro [{brief | description [interface interface-id] | name macro-name}] [ | {begin
| exclude | include} expression]
```

Syntax Description		
<b>brief</b>	(Optional)	Displays the name of each macro.
<b>description</b> [interface <i>interface-id</i> ]	(Optional)	Displays all macro descriptions or the description of a specific interface.
<b>name</b> <i>macro-name</i>	(Optional)	Displays information about a single macro identified by the macro name.
<b>begin</b>	(Optional)	Displays begins with the line that matches the <i>expression</i> .
<b>exclude</b>	(Optional)	Displays excludes lines that match the <i>expression</i> .
<b>include</b>	(Optional)	Displays includes lines that match the specified <i>expression</i> .
<i>expression</i>		Expression in the output to use as a reference point.

**Command Modes** User EXEC

Command History	Release	Modification
	12.1(19)EA1	This command was introduced on the Catalyst 3750 and 3560 switches.
	12.2(25)FX	This command was introduced on the Catalyst 2960 switches.
	12.2(44)SE	This command was introduced on the Catalyst 2918 switches.
	12.2(46)EX	This command was introduced on the Catalyst 2975 switches.
	12.2(35)SE2	This command was introduced on the Catalyst 3750-E and 3560-E switches.
	12.2(53)SE2	This command was introduced on the Catalyst 3750-X and 3560-X switches.

**Usage Guidelines** Expressions are case sensitive. For example, if you enter | **exclude output**, the lines that contain *output* do not appear, but the lines that contain *Output* appear.

**Examples** This is a partial output example from the **show parser macro** command. The output for the Cisco-default macros varies depending on the switch platform and the software image running on the switch:

```
Switch# show parser macro
Total number of macros = 6
-----
Macro name : cisco-global
Macro type : default global
# Enable dynamic port error recovery for link state
# failures
errdisable recovery cause link-flap
errdisable recovery interval 60
```

<output truncated>

```
-----
Macro name : cisco-desktop
Macro type : default interface
# macro keywords $AVID
# Basic interface - Enable data VLAN only
# Recommended value for access vlan (AVID) should not be 1
switchport access vlan $AVID
switchport mode access
```

<output truncated>

```
-----
Macro name : cisco-phone
Macro type : default interface
# Cisco IP phone + desktop template
# macro keywords $AVID $VVID
# VoIP enabled interface - Enable data VLAN
# and voice VLAN (VVID)
# Recommended value for access vlan (AVID) should not be 1
switchport access vlan $AVID
switchport mode access
```

<output truncated>

```
-----
Macro name : cisco-switch
Macro type : default interface
# macro keywords $NVID
# Access Uplink to Distribution
# Do not apply to EtherChannel/Port Group
# Define unique Native VLAN on trunk ports
# Recommended value for native vlan (NVID) should not be 1
switchport trunk native vlan $NVID
```

<output truncated>

```
-----
Macro name : cisco-router
Macro type : default interface
# macro keywords $NVID
# Access Uplink to Distribution
# Define unique Native VLAN on trunk ports
# Recommended value for native vlan (NVID) should not be 1
switchport trunk native vlan $NVID
```

<output truncated>

```
-----
Macro name : snmp
Macro type : customizable

#enable port security, linkup, and linkdown traps
snmp-server enable traps port-security
snmp-server enable traps linkup
snmp-server enable traps linkdown
#set snmp-server host
snmp-server host ADDRESS
#set SNMP trap notifications precedence
snmp-server ip precedence VALUE
-----
```

This is an example of output from the **show parser macro name** command:

```
Switch# show parser macro name standard-switch10
Macro name : standard-switch10
Macro type : customizable
macro description standard-switch10
# Trust QoS settings on VOIP packets
auto qos voip trust
# Allow port channels to be automatically formed
channel-protocol pagp
```

This is an example of output from the **show parser macro brief** command:

```
Switch# show parser macro brief
default global : cisco-global
default interface: cisco-desktop
default interface: cisco-phone
default interface: cisco-switch
default interface: cisco-router
customizable : snmp
```

This is an example of output from the **show parser macro description** command:

```
Switch# show parser macro description
Global Macro(s): cisco-global
Interface Macro Description(s)
-----
Gi1/0/1 standard-switch10
Gi1/0/2 this is test macro
-----
```

This is an example of output from the **show parser macro description interface** command:

```
Switch# show parser macro description interface gigabitethernet1/0/2
Interface Macro Description
-----
Gi1/0/2 this is test macro
-----
```

#### Related Commands

Command	Description
<b>macro apply</b>	Applies a macro on an interface or applies and traces a macro on an interface.
<b>macro description</b>	Adds a description about the macros that are applied to an interface.
<b>macro global</b>	Applies a macro on a switch or applies and traces a macro on a switch.
<b>macro global description</b>	Adds a description about the macros that are applied to the switch.
<b>show running-config</b>	Displays the operating configuration.

# show shell

To display shell information, use the **show shell** command in user EXEC mode.

```
show shell [environment | functions [brief | shell_function] | triggers] [{begin | exclude | include}
expression]
```

## Syntax Description

<b>environment</b>	(Optional) Displays shell environment information.
<b>functions</b> [brief   shell_function]	(Optional) Displays macro information. <ul style="list-style-type: none"> <li><b>brief</b>—Names of the shell functions.</li> <li><b>shell_function</b>—Name of a shell function.</li> </ul>
<b>triggers</b>	(Optional) Displays event trigger information.
<b>  begin</b>	(Optional) Displays begins with the line that matches the <i>expression</i> .
<b>  exclude</b>	(Optional) Displays excludes lines that match the <i>expression</i> .
<b>  include</b>	(Optional) Displays includes lines that match the specified <i>expression</i> .
<i>expression</i>	Expression in the output to use as a reference point.

## Command Modes

User EXEC

## Command History

Release	Modification
12.2(50)SE	This command was introduced on the Catalyst 3750-E, 3750, 3560-E, 3560, 2960, and 2918 switches.
12.2(52)SE	This command was introduced on the Catalyst 2975 switches.
12.2(53)SE2	This command was introduced on the Catalyst 3750-X and 3560-X switches.

## Usage Guidelines

Use this command to display the shell information for the switch.

Expressions are case sensitive. For example, if you enter **| exclude output**, the lines that contain output do not appear, but the lines that contain Output appear.

## Examples

This example shows how to use the **show shell triggers** privileged EXEC command to view the event triggers in the switch software:

```
Switch# show shell triggers
User defined triggers
-----
Built-in triggers
-----
Trigger Id: CISCO_CUSTOM_EVENT
Trigger description: Custom macroevent to apply user defined configuration
Trigger environment: User can define the macro
Trigger mapping function: CISCO_CUSTOM_AUTOSMARTPORT

Trigger Id: CISCO_DMP_EVENT
Trigger description: Digital media-player device event to apply port configuration
```



Trigger environment: Parameters that can be set in the shell - \$ACCESS\_VLAN=(1)  
The value in the parenthesis is a default value  
Trigger mapping function: CISCO\_DMP\_AUTO\_SMARTPORT

Trigger Id: CISCO\_IPVSC\_EVENT  
Trigger description: IP-camera device event to apply port configuration  
Trigger environment: Parameters that can be set in the shell - \$ACCESS\_VLAN=(1)  
The value in the parenthesis is a default value  
Trigger mapping function: CISCO\_IP\_CAMERA\_AUTO\_SMARTPORT

Trigger Id: CISCO\_LAST\_RESORT\_EVENT  
Trigger description: Last resortevent to apply port configuration  
Trigger environment: Parameters that can be set in the shell - \$ACCESS\_VLAN=(1)  
The value in the parenthesis is a default value  
Trigger mapping function: CISCO\_LAST\_RESORT\_SMARTPORT

Trigger Id: CISCO\_PHONE\_EVENT  
Trigger description: IP-phone device event to apply port configuration  
Trigger environment: Parameters that can be set in the shell - \$ACCESS\_VLAN=(1)  
and \$VOICE\_VLAN=(2), The value in the parenthesis is a default value  
Trigger mapping function: CISCO\_PHONE\_AUTO\_SMARTPORT

Trigger Id: CISCO\_ROUTER\_EVENT  
Trigger description: Router device event to apply port configuration  
Trigger environment: Parameters that can be set in the shell - \$NATIVE\_VLAN=(1)  
The value in the parenthesis is a default value  
Trigger mapping function: CISCO\_ROUTER\_AUTO\_SMARTPORT

Trigger Id: CISCO\_SWITCH\_ETHERCHANNEL\_CONFIG  
Trigger description: etherchannel parameter  
Trigger environment: \$INTERFACE\_LIST=(), \$PORT-CHANNEL\_ID=(),  
\$EC\_MODE=(), \$SEC\_PROTOCOLTYPE=(),  
PORT-CHANNEL\_TYPE=()  
Trigger mapping function: CISCO\_ETHERCHANNEL\_AUTOSMARTPORT

Trigger Id: CISCO\_SWITCH\_EVENT  
Trigger description: Switch device event to apply port configuration  
Trigger environment: Parameters that can be set in the shell - \$NATIVE\_VLAN=(1)  
The value in the parenthesis is a default value  
Trigger mapping function: CISCO\_SWITCH\_AUTO\_SMARTPORT

Trigger Id: CISCO\_WIRELESS\_AP\_EVENT  
Trigger description: Autonomous ap device event to apply port configuration  
Trigger environment: Parameters that can be set in the shell - \$NATIVE\_VLAN=(1)  
The value in the parenthesis is a default value  
Trigger mapping function: CISCO\_AP\_AUTO\_SMARTPORT

Trigger Id: CISCO\_WIRELESS\_LIGHTWEIGHT\_AP\_EVENT  
Trigger description: Lightweight-ap device event to apply port configuration  
Trigger environment: Parameters that can be set in the shell - \$ACCESS\_VLAN=(1)  
The value in the parenthesis is a default value  
Trigger mapping function: CISCO\_LWAP\_AUTO\_SMARTPORT

Trigger Id: word  
Trigger description: word  
Trigger environment:  
Trigger mapping function:

This example shows how to use the **show shell functions** privileged EXEC command to view the built-in macros in the switch software:

```
Switch# show shell functions
#User defined functions:

#Built-in functions:
function CISCO_AP_AUTO_SMARTPORT () {
    if [[ $LINKUP -eq YES ]]; then
        conf t
            interface $INTERFACE
                macro description $TRIGGER
                switchport trunk encapsulation dot1q
                switchport trunk native vlan $NATIVE_VLAN
                switchport trunk allowed vlan ALL
                switchport mode trunk
                switchport nonegotiate
                auto qos voip trust
                mls qos trust cos
                if [[ $LIMIT -eq 0 ]]; then
                    default srr-queue bandwidth limit
                else
                    srr-queue bandwidth limit $LIMIT
                fi
                if [[ $SW_POE -eq YES ]]; then
                    if [[ $AP125X -eq AP125X ]]; then
                        macro description AP125X
                        macro auto port sticky
                        power inline port maximum 20000
                    fi
                fi
            exit
        end
    fi
    if [[ $LINKUP -eq NO ]]; then
        conf t
            interface $INTERFACE
                no macro description
                no switchport nonegotiate
                no switchport trunk native vlan $NATIVE_VLAN
                no switchport trunk allowed vlan ALL
                no auto qos voip trust
                no mls qos trust cos
                default srr-queue bandwidth limit
                if [[ $AUTH_ENABLED -eq NO ]]; then
                    no switchport mode
                    no switchport trunk encapsulation
                fi
                if [[ $STICKY -eq YES ]]; then
                    if [[ $SW_POE -eq YES ]]; then
                        if [[ $AP125X -eq AP125X ]]; then
                            no macro auto port sticky
                            no power inline port maximum
                        fi
                    fi
                fi
            exit
        end
    fi
}
<output truncated>
```

<b>Related Commands</b>	<b>Command</b>	<b>Description</b>
	<b>macro auto device</b>	Configures macro default parameter values.
	<b>macro auto execute</b>	Configures mapping from an event trigger to a built-in macro.
	<b>macro auto global processing</b>	Enables Auto Smartports on a switch.
	<b>macro auto mac-address-group</b>	Configures MAC address groups.
	<b>macro auto sticky</b>	Configures macro persistence.
	<b>shell trigger</b>	Creates event triggers.
	<b>show macro auto</b>	Displays information about macros.

■ show shell