Cisco IOS Firewall Support for TRP

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To guarantee service and security, the deployment of voice services over IP networks requires special handling of secondary channels within the network. When Trust Relay Points (TRPs) are implemented in voice networks, the networks must account for the following caveats when handling the opening of secondary channels.

- Networks do not always see the signaling messages. (The signaling messages are most likely encrypted.)
- Networks that do see signaling messages cannot deep inspect the messages.
- Networks use other means to learn about the media channels that are being negotiated and opened.

Consequently, transparent entities, such as the Cisco IOS Firewall, that are operating on the networks, must process media channels differently.

This feature enables Cisco IOS Firewall to process Session Traversal Utilities for NAT (STUN). STUN messages open connections between ports for secondary channels, known as pinholes, which are necessary for implementation of TRPs in voice networks.

Finding Feature Information

Your software release may not support all the features documented in this module. For the latest feature information and caveats, see the release notes for your platform and software release. To find information about the features documented in this module, and to see a list of the releases in which each feature is supported, see the "Feature Information for Firewall Support for TRP" section on page 13.

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

Contents

Prerequisites for Firewall Support for TRP

Before configuring STUN to open pinholes for data, ensure that the voice protocol control packets in your network are not blocked by the Cisco IOS Firewall.

Restrictions for Firewall Support for TRP

- You must configure different agent IDs under a single parameter map. If different agent IDs are configured under two different parameter maps and then the STUN inspection of the two parameter maps are out in the same policy map (per the sample configuration below), the firewall will drop the packet. For example, if you are sending a packet with agent ID 21, the firewall will check the first class map called “stun-ice” and then drop the packet because it did not find a match in that class map.

```
parameter-map type protocol-info stun-ice cfd1
 authorization agent-id 20 shared-secret 12345flower12345 cat-window 15
 authorization agent-id 22 shared-secret 12345cisco54321 cat-window 15
parameter-map type protocol-info stun-ice cfd2
 authorization agent-id 21 shared-secret 12345flower54321 cat-window 15
!
class-map type inspect match-all stun-ice
 match protocol stun-ice cfd1
class-map type inspect match-any stun-ice1
 match protocol stun-ice cfd2
!
policy-map type inspect policy_test
 class type inspect class_1
  pass
 class type inspect sip_ctrl_channel
  inspect
 class type inspect stun-ice
  inspect
 class type inspect stun-ice1
  inspect
 class class-default
  drop
```

Information About Firewall Support for TRP

Cisco IOS Firewall

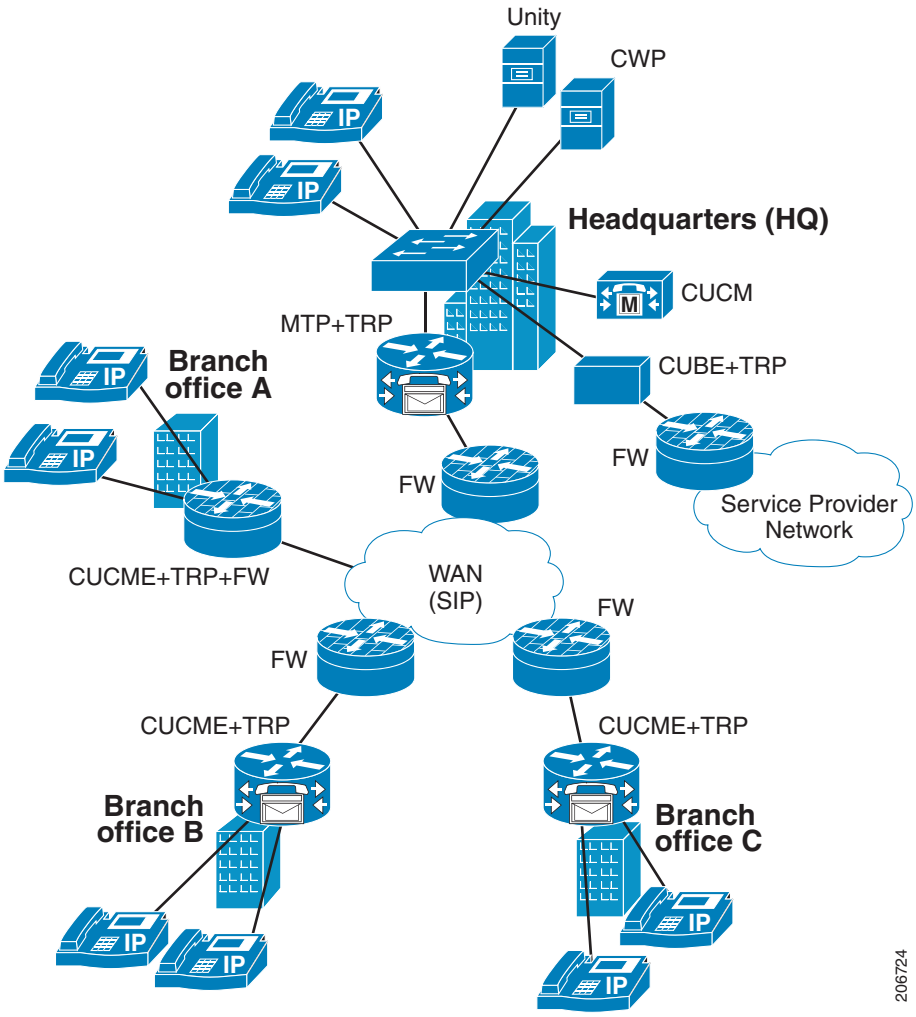
The Cisco IOS Firewall extends the concept of static access control lists (ACLs) by introducing dynamic ACL entries that open on the basis of the necessary application ports on a specific application and close these ports at the end of the application session. The Cisco IOS Firewall achieves this functionality by inspecting the application data, checking for conformance of the application protocol, extracting the relevant port information to create the dynamic ACL entries, and closing these ports at the end of the session. The Cisco IOS Firewall is designed to easily allow a new application inspection whenever support is needed.

How Cisco IOS Firewall Supports TRP in a Voice Network

The following information describes the deployment scenarios supported by the Cisco IOS Firewall with TRP present in a voice network:

- For the Cisco IOS Firewall that is running on a Cisco router without TRP, STUN packets are processed as regular passthrough packets. To open a pinhole for secondary channels, the firewall must be able to recognize the STUN packets.
- For the Cisco IOS Firewall that is running on a Cisco router with TRP (Branch Office A in Figure 1), the firewall will intercept and act on the STUN packets that are sent from the TRP on its WAN side. Cisco IOS firewall validates the Cisco Proprietary Cisco Flow-Data information on the STUN packet and opens the data-channel pinholes for voice traffic. The Cisco Flow-Data has information to authenticate that the message is from a valid TRP device.
- The phones do not yet support STUN. If the firewall has to open pinholes between phones, TRP should send one-sided STUN messages addressed to each phone so the firewall can see the messages and open the pinholes. Without the support of STUN messages from TRP, the firewall would not be able to open the necessary pinholes for the phones to communicate.

Figure 1 Architecture for Cisco IOS Firewall in a TRP Network Solution



How Cisco IOS Firewall Supports Partial SIP Inspection

Cisco IOS Firewall TRP support enables Cisco IOS Firewall to process UDP STUN messages that open pinholes for secondary channels, which are necessary for implementation of TRPs in voice networks.

Previous implementations of Cisco IOS Firewall, SIP clients could negotiate with the server to dynamically open control channels on a port, which could not be supported using the access-group class map. In addition, SIP traffic was sent through the firewall without any protocol conformance checks.

To overcome these issues, Cisco IOS Firewall supports partial SIP inspection. This allows the SIP Application-level Gateway (ALG) to parse the entire SIP message, including the Session Description Protocol (SDP) part to check for protocol conformance, but does not allows SIP ALG to open pinholes for media information found in the SDP message. The STUN ALG is allowed to open the pinholes in the firewall.

Because partial SIP inspection decouples the media channel from the SIP control channel, SIP ALG can no longer depend on media channel inactivity to timeout the control sessions. Therefore, the SIP ALG implementation in this environment depends on the UDP timeout configured on the router. Because the default setting is low (30 seconds), you must set the UDP timeout value to a value slightly longer than the SIP call duration, when configuring the system.

Note In Cisco IOS Release 12.4(22)T, if you need to allow SIP control traffic, you must configure the match access-group filter. This filter allows SIP traffic to pass through the firewall without the protocol conformance check (Deep Packet Inspection).

TRP Messages

TRP uses the following message types to control how the Cisco IOS Firewall manages sessions:

- Keep-Alive messages

  To keep the Cisco IOS Firewall media sessions active the TRP generates authenticated keep-alive messages which must be validated to keep the session open. The keep-alive messages are valid only for a configured length of time, which is configured on the call-control entity (CCE). The Cisco IOS Firewall must receive a new message within the configured time, otherwise it closes the pinhole. The keep-alive message has the Cryptographic Authentication Token (CAT) obtained from the CCE which must be validated by the Cisco IOS Firewall before the keep-alive message is accepted.

- Periodic Open messages

  The CAT (obtained from the CCE) is valid only for the CAT-life seconds setting configured on the CCE. After that time TRP gets a new CAT and sends a new message with the new CAT. This periodic open message specifies the keys that the Cisco IOS Firewall uses to authenticate the keep-alive messages until the next new CAT is obtained. Therefore, if the Cisco IOS Firewall does not receive a new CAT with the time specified by the CAT-life seconds, the media session closes as it cannot authenticate any keep-alive messages.

- Close pinhole message

  If the Cisco IOS Firewall receives a STUN message from TRP that indicates that a session should be active for 0 seconds (Seconds-Active = 0), it first validates the packet, then generates a syslog message and then allows the message to pass through the Cisco IOS Firewall so that other firewalls on the path can also see the message and close their session, finally it closes the session.

- STUN messages from a remote party

  When TRP is configured on both the caller and the called side, the Cisco IOS Firewall receives 2 STUN messages for the same session. The Cisco IOS Firewall does not validate STUN messages from the remote party, instead it drops the packets and generates a syslog message.

How to Configure a Firewall to Support TRP in Voice Networks

- Configuring a Policy to Allow STUN Messages, page 6
- Configuring Maps to Allow Partial SIP Inspection, page 8
- Configuring a Parameter Map for TRP Support, page 10

Configuring a Policy to Allow STUN Messages

Perform this task to configure a policy to allow STUN messages.

Prerequisites

If the firewall is configured on the same device as the TRP, the STUN policy needs to be applied on the zone-pair between self and out zones.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **class-map type inspect** [**match any** | **match all**] *class-map-name*
4. **match protocol** *stun-ice stun-ice-parameter-map*
5. **exit**
6. **class-map type inspect** [**match any** | **match all**] *class-map-name*
7. **match access-group** {*access-group* | **name access-group-name**}
8. **match protocol** *stun-ice stun-ice-parameter-map*
9. **exit**
10. **policy-map type inspect** *policy-map-name*
11. **class type inspect** *class-name*
12. **inspect**
13. **exit**
14. **class type inspect** *class-name*
15. **inspect**
16. **exit**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Router> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Router# configure terminal`	Enters global configuration mode.

	Command or Action	Purpose
Step 3	**class-map type inspect** [**match any** | **match all**] *class-map-name* **Example:** `Router(config)# class-map type inspect stun-traffic`	Creates an inspect type class map and enters class-map configuration mode.
Step 4	**match protocol** *stun-ice stun-ice-parameter-map* **Example:** `Router(config-cmap)# match protocol stun-ice cfd1`	Configures the match criteria for a class map on the basis of a specified protocol.
Step 5	**exit** **Example:** `Router(config-cmap)# exit`	Exits class-map configuration mode.
Step 6	**class-map type inspect** [**match any** | **match all**] *class-map-name* **Example:** `Router(config)# class-map type inspect voice-control-traffic`	Creates an inspect type class map and enters class-map configuration mode.
Step 7	**match access-group** {*access-group* | **name access-group-name**} **Example:** `Router(config-cmap)# match access-group 101`	Configures the match criteria for a class map based on the ACL name or number.
Step 8	**match protocol** *stun-ice stun-ice-parameter-map* **Example:** `Router(config-cmap)# match protocol stun-ice cfd2`	Configures the match criteria for a class map on the basis of a specified protocol.
Step 9	**exit** **Example:** `Router(config-cmap)# exit`	Exits class-map configuration mode.
Step 10	**policy-map type inspect** *policy-map-name* **Example:** `Router(config)# policy-map type inspect voice-traffic`	Creates an inspect type policy map and enters policy map configuration mode.
Step 11	**class type inspect** *class-name* **Example:** `Router(config-pmap)# class type inspect voice-control-traffic`	Specifies the traffic (class) on which an action is to be performed.

	Command or Action	Purpose
Step 12	**inspect** **Example:** `Router(config-pmap-c)# inspect`	Enables Cisco IOS stateful packet inspection.
Step 13	**exit** **Example:** `Router(config-pmap-c)# exit`	Exits policy map class configuration mode.
Step 14	**class type inspect** *class-name* **Example:** `Router(config-pmap)# class type inspect stun-traffic`	Specifies the traffic (class) on which an action is to be performed.
Step 15	**inspect** **Example:** `Router(config-pmap-c)# inspect`	Enables Cisco IOS stateful packet inspection.

Step 16	**exit**
	
	Example:
	`Router(config-pmap-c)# exit`
	`Router(config-pmap)# exit`
		Exits policy map class and policy map configuration mode.

Configuring Maps to Allow Partial SIP Inspection

Perform this task to define a parameter map that does not create or open a media channel when the parameter map is attached to the SIP class map.

Prerequisites

Because partial SIP inspection decouples the media channel from the SIP control channel, SIP ALG can no longer depend on media channel inactivity to timeout the control sessions. Therefore, the SIP ALG implementation in this environment depends on the UDP timeout configured on the router. Because the default setting is low (30 seconds), you must set the UDP timeout value to a value slightly longer than the SIP call duration, when configuring the system.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **parameter-map type protocol-info sip** *parameter-map-name*
4. **disable open-media-channel**
5. **exit**
6. **class-map type inspect** *class-map-name*

7. **match protocol sip** *parameter-map-name*
8. **exit**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Router> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Router# configure terminal`	Enters global configuration mode.
Step 3	**parameter-map type protocol-info sip** *parameter-map-name* **Example:** `Router(config)# parameter-map type protocol-info sip pmap-sip`	Defines a SIP-protocol-info parameter map and enters parameter map type configuration mode.
Step 4	**disable open-media-channel** **Example:** `Router(config-profile)# disable open-media-channel`	Prevents the creation of a media channel when this parameter map is attached to the SIP class map.
Step 5	**exit** **Example:** `Router(config-profile)# exit`	Exits parameter map type configuration mode.
Step 6	**class-map type inspect** *class-map-name* **Example:** `Router(config)# class-map type inspect cmap-sip-traffic`	Creates an inspect type class map and enters class-map configuration mode.
Step 7	**match protocol sip** *parameter-map-name* **Example:** `Router(config-cmap)# match protocol sip pmap-sip`	Configures the match criteria for a class map on the basis of a specified protocol.
Step 8	**exit** **Example:** `Router(config-cmap)# exit`	Exits class-map configuration mode.

Configuring a Parameter Map for TRP Support

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **parameter-map type protocol-info stun-ice** *parameter-map-name*
4. **authorization** *agent-id* **shared-secret** *password* **cat-window** *number*

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Router> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Router# configure terminal`	Enters global configuration mode.
Step 3	**parameter-map type protocol-info stun-ice** *parameter-map-name* **Example:** `Router(config)# parameter-map type protocol-info stun-ice abc1`	Defines an application-specific parameter map and enters parameter map type configuration mode.
Step 4	**authorization** *agent-id* **shared-secret** *password* **cat-window** *number* **Example:** `Router(config-profile)# authorization agent-id 20 shared-secret 12345flower12345 cat-window 15`	Configures the credentials of more than one authorization agent in the same parameter map and associates the same credentials with the filter that was set up via the **match protocol stun-ice** command.

Configuration Examples for Firewall and TRP in a Voice Network

- Example: Cisco IOS Firewall Support of STUN Messages in Voice Network Configuration

Example: Cisco IOS Firewall Support of STUN Messages in Voice Network Configuration

The following example shows how to configure a Cisco IOS Firewall policy to support STUN messages:

```
parameter-map type protocol-info stun-ice abc1
 authorization agent-id 10 password letmein CAT-window 3
class-map type inspect stun-traffic
 match protocol stun-ice abc1
class-map type inspect voice-control-traffic
 match access-group 101
 match protocol udp
policy-map type inspect voice-traffic
 class type inspect voice-control-traffic
  inspect
 class type inspect stun-traffic
  inspect

access-list 101 permit ip 10.0.0.0 255.255.255.255 2.2.2.2 255.255.255.255

! Allow SIP control packets to ensure the Cisco IOS firewall does not open secondary
! channels for media.
!
access-list 101 permit tcp any any eq 5060
access-list 101 permit udp any any eq 5060
!
class-map type inspect voice-control-traffic
 match access-group 101
!
policy-map type inspect policy_test
 class type inspect voice-control-traffic
  inspect
```

Additional References

The following sections provide references related to the Cisco IOS Firewall Support for TRP feature.

Related Documents

Related Topic	Document Title
Cisco IOS commands	*Cisco IOS Master Commands List, All Releases*
Additional firewall commands	*Cisco IOS Security Command Reference*
Zone-based policy firewall	*Zone-Based Policy Firewall*

Standards

Standard	Title
None	—

MIBs

MIB	MIBs Link
None	To locate and download MIBs for selected platforms, Cisco IOS releases, and feature sets, use Cisco MIB Locator found at the following URL: http://www.cisco.com/go/mibs

RFCs

RFC	Title
None	

Technical Assistance

Description	Link
The Cisco Support and Documentation website provides online resources to download documentation, software, and tools. Use these resources to install and configure the software and to troubleshoot and resolve technical issues with Cisco products and technologies. Access to most tools on the Cisco Support and Documentation website requires a Cisco.com user ID and password.	http://www.cisco.com/cisco/web/support/index.html

Feature Information for Firewall Support for TRP

Table 1 lists the features in this module and provides links to specific configuration information.

Use Cisco Feature Navigator to find information about platform support and software image support. Cisco Feature Navigator enables you to determine which software images support a specific software release, feature set, or platform. To access Cisco Feature Navigator, go to http://www.cisco.com/go/cfn. An account on Cisco.com is not required.

Note Table 1 lists only the software release that introduced support for a given feature in a given software release train. Unless noted otherwise, subsequent releases of that software release train also support that feature.

Table 1 Feature Information for Firewall Support for TRP

Feature Name	Releases	Feature Information
Cisco IOS Firewall Support for TRP—Phase 1	12.4(11)T	This feature enables Cisco IOS Firewall to process STUN messages. STUN messages open pinholes for secondary channels, which are necessary for implementation of TRPs in voice networks. The following commands were introduced or modified: **authorization agent-id**, **match protocol**, **parameter-map type**.
Cisco IOS Firewall Support for TRP—Phase 2	15.0(1)M	This feature enables Cisco IOS Firewall to perform partial SIP inspection and modifies some processes that were introduced in Phase 1. The following commands were introduced or modified: **parameter-map type protocol-info**, **disable open-media-channel**.