

Configuring ISG Port-Bundle Host Key

The Intelligent Services Gateway (ISG) provides a structured framework in which edge devices can deliver flexible and scalable services to subscribers. This module describes how to configure the ISG Port-Bundle Host Key feature, which maps TCP packets from subscribers to a local IP address for the ISG and a range of ports. This mapping allows an external portal to identify the ISG from which a session originated.

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Prerequisites for the ISG Port-Bundle Host Key Feature

- The ISG Port-Bundle Host Key feature must be enabled separately at the portal and at all connected ISGs.
- All ISG source IP addresses configured with the **source** command must be routable in the management network where the portal resides.
- For each portal server, all connected ISGs must have the same port-bundle length.
- The external portal must support port-bundle host keys and must be configured with the same port-bundle host key parameters.

Restrictions for the ISG Port-Bundle Host Key Feature

- The ISG Port-Bundle Host Key feature uses TCP. Packets will not be mapped for a subscriber who does not send TCP traffic.
- Specifying the ISG Port-Bundle Host Key feature in a user profile works only when the user profile is available prior to the arrival of IP packets; for example, for PPP sessions or for DHCP-initiated IP sessions with transparent autologon.

Information About ISG Port-Bundle Host Key

Overview of ISG Port-Bundle Host Key

The ISG Port-Bundle Host Key feature serves as an in-band signaling mechanism for session identification at external portals. TCP packets from subscribers are mapped to a local IP address for the ISG and a range of ports. This mapping allows the portal to identify the ISG from which the session originated. The mapping also identifies sessions uniquely even when subscribers have overlapping IP addresses. The ISG Port-Bundle Host Key feature enables a single portal to be deployed for multiple virtual routing and forwarding (VRF) instances even when there are subscribers with overlapping IP addresses.

Port-Bundle Host Key Mechanism

With the ISG Port-Bundle Host Key feature, an ISG performs Port-Address Translation (PAT) and Network Address Translation (NAT) on TCP traffic between the subscriber and the portal. When a subscriber TCP connection is set up, the ISG creates a port mapping that changes the source IP address to a configured ISG IP address and changes the source TCP port to a port allocated by the ISG. The ISG assigns a bundle of ports to each subscriber because one subscriber can have several simultaneous TCP sessions when accessing a web page. The assigned port-bundle host key, or a combination of the port bundle and the ISG source IP address, uniquely identifies each subscriber. The host key is carried in RADIUS packets sent between the portal server and the ISG in the Subscriber IP vendor-specific attribute (VSA). The table below describes the Subscriber IP VSA. When the portal server sends a reply to the subscriber, the ISG uses translation tables to identify the destination IP address and destination TCP port.

Table 1: Subscriber IP VSA Description

Attribute ID	Vendor ID	Subattribute ID and Type	Attribute Name	Attribute Data
26	9	250 Account-Info	Subscriber IP	S *subscriber-ip-address* [:*port-bundle-number*] • S—Account-Info code for subscriber IP. • *subscriber-ip-address* [:*port-bundle-number*]—The port-bundle number is used only if the ISG Port-Bundle Host Key feature is configured.

For each TCP session between a subscriber and the portal, the ISG uses one port from the port bundle as the port map. Individual port mappings are flagged as eligible for reuse on the basis of inactivity timers, but are not explicitly removed once assigned. The number of port bundles is limited per ISG address, but there is no limit to the number of ISG IP addresses that can be configured for port bundle usage.

Note The ISG Port-Bundle Host Key feature assigns ISG IP addresses to the source IP in a round-robin fashion based on the available IP addresses and ports.

Port-Bundle Length

The port-bundle length is used to determine the number of ports in one bundle. By default, the port-bundle length is 4 bits. The maximum port-bundle length is 10 bits. See the table below for available port-bundle length values and the resulting port-per-bundle and bundle-per-group values. You may want to increase the port-bundle length when you see frequent error messages about running out of ports in a port bundle.

Table 2: Port-Bundle Lengths and Resulting Port-per-Bundle and Bundle-per-Group Values

Port-Bundle Length (in Bits)	Number of Ports per Bundle	Number of Bundles per Group (and per ISG Source IP Address)
0	1	64512
1	2	32256
2	4	16128
3	8	8064
4 (default)	16	4032
5	32	2016
6	64	1008
7	128	504
8	256	252
9	512	126
10	1024	63

Note For each portal server, all connected ISGs must have the same port-bundle length, which must correspond to the configured value given in the portal server's BUNDLE_LENGTH argument. If you change the port-bundle length on an ISG, be sure to make the corresponding change in the configuration on the portal.

Benefits of ISG Port-Bundle Host Key

Support for Overlapped Subscriber IP Addresses Extended to Include External Portal Usage

The ISG Port-Bundle Host Key feature enables external portal access regardless of the subscriber IP address or VRF membership. Without the use of port-bundle host keys, all subscribers accessing a single external portal must have unique IP addresses. Furthermore, because port-bundle host keys isolate VRF-specific addresses from the domain in which the portal resides, routing considerations are simplified.

Portal Provisioning for Subscriber and ISG IP Addresses No Longer Required

Without the ISG Port-Bundle Host Key feature, a portal must be provisioned for subscriber and ISG IP addresses before the portal is able to send RADIUS packets to the ISG or HTTP packets to subscribers. The ISG Port-Bundle Host Key feature eliminates the need to provision a portal to allow one portal server to serve multiple ISGs and one ISG to be served by multiple portal servers.

How to Configure ISG Port-Bundle Host Key

Enabling the ISG Port-Bundle Host Key Feature in a Service Policy Map

Perform this task to enable the ISG Port-Bundle Host Key feature in a service policy map. The ISG Port-Bundle Host Key feature will be applied to any subscriber who uses this service policy map.

Note We recommend that you use a dedicated service policy for the feature. Do not share a policy with other ISG features.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **policy-map type service** *policy-name*
4. **ip portbundle**
5. **end**

DETAILED STEPS

Procedure

	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	**policy-map type service** *policy-name* **Example:** `Router(config)# policy-map type service service1`	Creates or defines a service policy map, which is used to define an ISG service.

	Command or Action	Purpose
Step 4	**ip portbundle** **Example:** `Router(config-service-policymap)# ip portbundle`	Enables the ISG Port-Bundle Host Key feature for the service.
Step 5	**end** **Example:** `Router(config-service-policymap)# end`	(Optional) Returns to privileged EXEC mode.

What to Do Next

You may want to configure a method for activating the service policy map or service profile; for example, control policies can be used to activate services. For more information about methods of service activation, see the module "Configuring ISG Subscriber Services."

Enabling the ISG Port-Bundle Host Key Feature in a User Profile or Service Profile on the AAA Server

SUMMARY STEPS

1. Add the Port-Bundle Host Key attribute to the user or service profile.

DETAILED STEPS

Procedure

	Command or Action	Purpose
Step 1	Add the Port-Bundle Host Key attribute to the user or service profile. **Example:** `26,9,1 = "ip:portbundle=enable"`	Enables the ISG Port-Bundle Host Key feature in the user or service profile.

What to Do Next

If you enabled the ISG Port-Bundle Host Key feature in a service profile, you may want to configure a method of activating the service profile; for example, control policies can be used to activate services. For more information about methods of service activation, see the "Configuring ISG Subscriber Services" module.

Configuring Port-Bundle Host Key Parameters

Perform this task to configure ISG Port-Bundle Host Key parameters and specify the interface for which ISG will use translation tables to derive the IP address and port number for downstream traffic.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **ip portbundle**
4. **match access-list** *access-list-number*
5. **length** *bits*
6. **source** *interface-type interface-number*
7. **exit**
8. **interface** *type number*
9. **ip portbundle outside**
10. **end**

DETAILED STEPS

Procedure

	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	**ip portbundle** **Example:** `Router(config)# ip portbundle`	Enters IP portbundle configuration mode.
Step 4	**match access-list** *access-list-number* **Example:** `Router(config-portbundle)# match access-list 101`	Specifies packets for port mapping by specifying an access list to compare against the subscriber traffic.
Step 5	**length** *bits* **Example:** `Router(config-portbundle)# length 5`	Specifies the ISG port-bundle length, which determines the number of ports per bundle and bundles per group. • The default number of bits is 4. • See the section “Port-Bundle Length” for more information.

	Command or Action	Purpose
Step 6	**source** *interface-type interface-number* **Example:** `Router(config-portbundle)# source loopback 0`	Specifies the interface for which the main IP address is mapped by ISG to the destination IP addresses in subscriber traffic. • We recommend that you use a loopback interface as the source interface.
Step 7	**exit** **Example:** `Router(config-portbundle)# exit`	Returns to global configuration mode.
Step 8	**interface** *type number* **Example:** `Router(config)# interface gigabitethernet 0/0/0`	Specifies an interface for configuration and enters the interface configuration mode.
Step 9	**ip portbundle outside** **Example:** `Router(config-if)# ip portbundle outside`	Configures ISG to reverse translate the destination IP address and TCP port to the actual subscriber IP address and TCP port for traffic going from the portal to the subscriber for the interface being configured.
Step 10	**end** **Example:** `Router(config-if)# end`	Exits interface configuration mode.

Verifying the ISG Port-Bundle Host Key Configuration

SUMMARY STEPS

1. **enable**
2. **show ip portbundle status** [**free** | **inuse**]
3. **show ip portbundle ip** *portbundle-ip-address* **bundle** *port-bundle-number*
4. **show subscriber session** [**detailed**] [**identifier** *identifier* | **uid** *session-id* | **username** *name*]

DETAILED STEPS

Procedure

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

	Command or Action	Purpose
Step 2	**show ip portbundle status** [**free** | **inuse**] **Example:** `Router# show ip portbundle status free`	Displays information about ISG port-bundle groups.
Step 3	**show ip portbundle ip** *portbundle-ip-address* **bundle** *port-bundle-number* **Example:** `Router# show ip portbundle ip 10.10.10.10 bundle 65`	Displays information about a specific ISG port bundle.
Step 4	**show subscriber session** [**detailed**] [**identifier** *identifier* | **uid** *session-id* | **username** *name*] **Example:** `Router# show subscriber session detailed`	Displays ISG subscriber session information.

Configuration Examples for ISG Port-Bundle Host Key

Example: Configuring ISG Port-Bundle Host Key

The following example shows how to apply the ISG Port-Bundle Host Key feature to all sessions:

```
policy-map type service ISGPBHKService
 ip portbundle
!
policy-map type control PBHKRule
 class type control always event session-start
  1 service-policy type service ISGPBHKService
!
service-policy type control PBHKRule
interface gigabitethernet0/0/0
 ip address 10.1.1.1 255.255.255.0
 ip portbundle outside
!
ip portbundle
 match access-list 101
 length 5
 source loopback 0
```

Additional References

Related Documents

Related Topic	Document Title
Cisco IOS commands	Cisco IOS Master Command List, All Releases
ISG commands	Cisco IOS Intelligent Services Gateway Command Reference

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 ISG Port-Bundle Host Key

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

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

Table 3: Feature Information for ISG Port-Bundle Host Key

Feature Name	Releases	Feature Configuration Information
ISG Port-Bundle Host Key	Cisco IOS XE Release 2.2	The ISG Port-Bundle Host Key feature serves as an in-band signaling mechanism for session identification at external portals. TCP packets from subscribers are mapped to a local IP address for the ISG and a range of ports. This mapping allows the portal to identify the ISG from which the session originated.