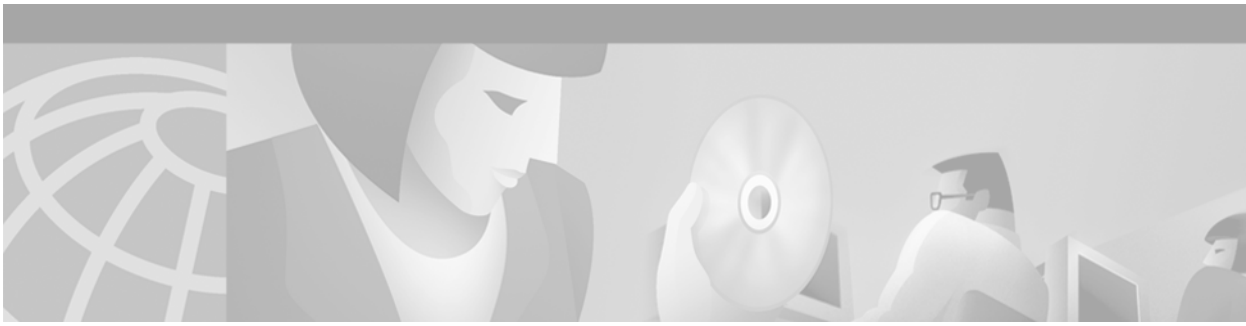

Gateway Trunk and Carrier Based Routing Enhancements

Feature History

Release	Modification
12.2(2)XU	This feature is introduced for H.323 and SIP interfaces on the Cisco 2600 series, Cisco 3600 series, Cisco AS5300, Cisco AS5350, Cisco AS5400, Cisco AS5800, and Cisco AS5850.

This feature module describes the Gateway Trunk and Carrier Based Routing Enhancements feature functionality in Cisco IOS Release 12.2(2)XU, and includes the following sections:

- Feature Overview, page 1
- Supported Platforms, page 17
- Supported Standards, MIBs, and RFCs, page 17
- Prerequisites, page 18
- Configuration Tasks, page 19
- Monitoring and Maintaining Gateway Trunk and Carrier Based Routing, page 28
- Configuration Examples, page 28
- Command Reference, page 38
- Glossary, page 141

For information on routing enhancements for gatekeepers, see *Gatekeeper Trunk and Carrier Based Routing Enhancements*.

Feature Overview

Voice wholesalers use multiple ingress and egress carriers to route traffic. A call coming in to a gateway on a particular ingress carrier must be routed to an appropriate egress carrier. As networks grow and become more complicated, the dial plans needed to route the carrier traffic efficiently become more complex and the need for carrier sensitive routing (CSR) increases.

The Gateway Trunk and Carrier Based Routing Enhancements feature implements CSR for Cisco voice gateways. The gateway feature described in this document adds the following routing features:

- Implementation of trunk groups and enhanced key matches on several platforms and interfaces

- Reduction of the number of dial peers in a dial plan by using profile aggregation and multiple trunk group supports
- Enhanced hunting schemes
- Carrier ID support
- Trunk group label support
- Number translation profiles per trunk group, source IP group, voice port, and dial peer
- Dial peer support of multiple trunk groups with translations per trunk group
- ENUM support
- Source IP groups
- Voice over IP (VoIP) access list control
- Enhanced translation rules in SED (stream editor) regular expressions
- Incoming call blocking
- Cisco IVR 2.0 support for carrier ID based dial peer matching, incoming call blocking, and dial peer number translation
- Call detail record (CDR) support
- Virtual private network (VPN) source routing (also referred to as static or basic carrier routing)

The following call handling sequence gives some orientation to these new capabilities.

In a typical scenario, a call from the PSTN arrives at a gateway (the ingress gateway), leaves the gateway as a VoIP call, arrives at a destination gateway (the egress gateway), and leaves that gateway as a PSTN call. For this example, trunk groups and translation rules have been defined using commands described later in this document. Figure 1 and Table 1 describe what happens to the call in the ingress gateway. Figure 2 and Table 2 describe the call handing activities in the egress gateway. Steps affected by the trunk groups and translation rules implemented in this feature are marked as “new”.

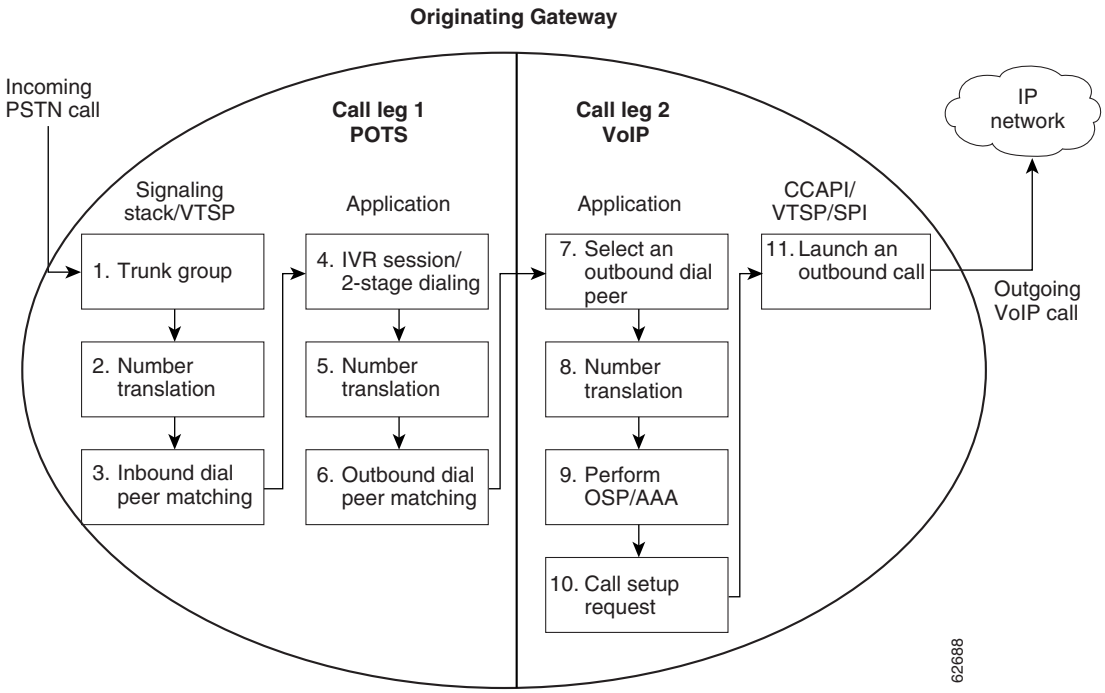

Table 1 Call Handling in the Ingress (Originating) Gateway

PSTN Side	VoIP Side
1. A PSTN call arrives from a trunk group. This is call leg 1.	7. The gateway selects an outbound dial peer from a list of matched dial peers.
2. (new) The gateway translates the called, calling, and redirect numbers using the incoming translation rule of the trunk group. The incoming call is associated with a carrier ID or trunk group label based on the trunk group configuration.	8. (new) The gateway translates the numbers using the outgoing translation rule of the outbound dial peer.
3. The gateway matches the translated numbers or the source carrier ID or source trunk group label to an inbound dial peer.	9. (new) If Open Settlements Protocol (OSP) is configured on the gateway, the gateway performs OSP on the translated call numbers. The OSP token contains the final translated call numbers.
4. The gateway starts an IVR session or 2-stage dialing for the translated call.	10. The gateway makes a call setup request. If the outgoing call is going to be routed using H.323 or SIP, the gateway sends the call's source carrier ID to the terminating gateway.
5. (new) The gateway translates the numbers again using the incoming translation rule of the inbound dial peer.	11. The outbound VoIP call goes out. This is call leg 2.
6. The gateway uses the newly translated called numbers to match an outbound dial peer. At the same time, the gateway performs AAA operations on the translated call numbers.	

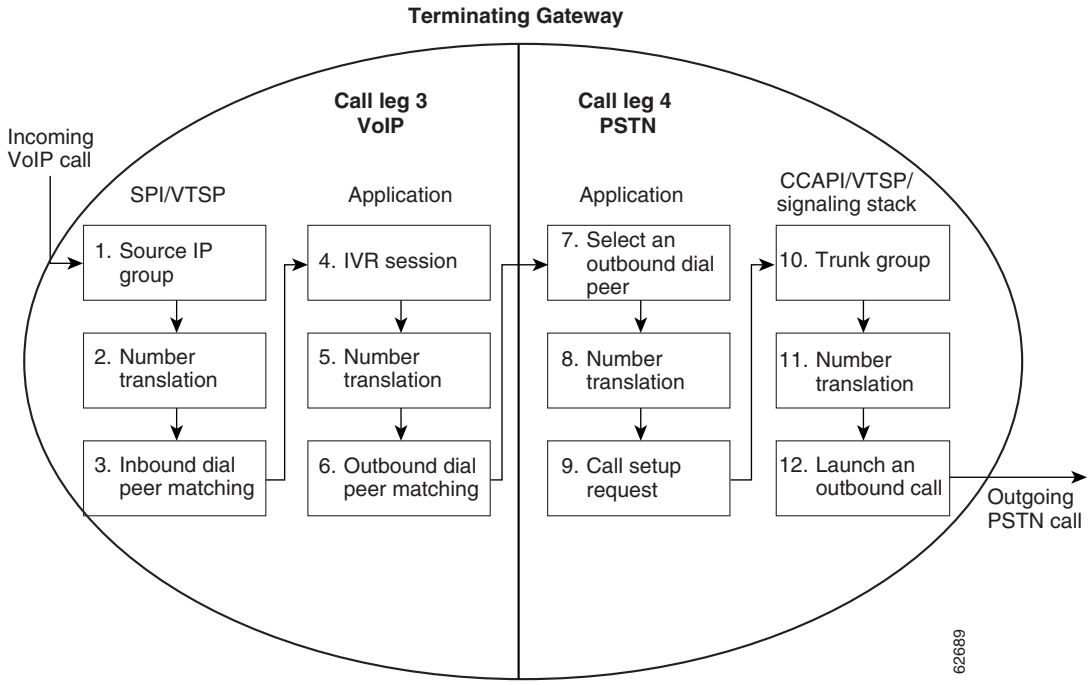

Table 2 Call Handling in the Egress (Terminating) Gateway

VoIP Side	PSTN Side
1. (new) A VoIP call arrives from a source IP group. This is call leg 3. Depending on how the source IP group is defined, the incoming H.323 or SIP call may be matched to a source carrier ID, source trunk-group label, source IP address, or (for H.323 calls only) source H.323 zone ID. The gateway uses the source IP group to associate the call with a target carrier ID or target trunk-group label for matching the outbound dial peer.	7. The gateway selects an outbound dial peer.
2. (new) The gateway translates the incoming call numbers using the incoming translation rule of the source IP group.	8. (new) The gateway translates the numbers using the outgoing translation rule of the outbound dial peer.
3. The gateway matches the translated numbers to an inbound dial peer.	9. The gateway makes a call setup request.
4. The gateway starts an IVR session or 2-stage dialing for the incoming call.	10. (new) The gateway selects an interface from a trunk group to make an outbound call.
5. (new) The gateway translates the numbers again using the incoming translation rule of the inbound dial peer.	11. (new) The gateway translates the number using the outgoing translation rule of a trunk group.
6. The gateway uses the newly translated number, the target carrier ID, or the target trunk-group-label to match an outbound dial peer.	12. The outbound PSTN call goes out. This is call leg 4.

The components of the scenarios described in Tables 1 and 2 are detailed in the following sections:

- Trunk Groups, page 5
- Carrier IDs, page 8
- Trunk Group Labels, page 9
- Number Translation, page 9
- Multiple Trunk Group Support, page 10
- ENUM Support, page 11
- Source IP Groups, page 12
- Translation Rules and Translation Profiles, page 13
- Incoming Call Blocking, page 15
- Call Detail Record (CDR) Report, page 16

Trunk Groups

This software feature provides these characteristics for a trunk group:

- A trunk group is a logical grouping of interfaces with the same signaling characteristics.
- The trunk group can be configured as the target of an outbound dial peer.
- A dial-peer can have multiple trunk groups configured for it.
- Up to 1000 trunk groups can be configured on the gateway.
- The real-time call capacity information for a trunk group is sent to the H.323 gatekeeper using the H.323 Version 4 protocol.
- A trunk group resource manager selects a voice port from the trunk group to make an outgoing call.

In addition to supporting existing trunk group functionality for PRI and BRI interfaces, this trunk and carrier routing enhancements feature adds trunk group support for these interfaces:

- T1/E1 DS-0 group (FXS, FXO, E&M, DID, R2 digital/pulse/analog)
- FXS, FXO, E&M, and DID analog voice ports
- NFAS PRI T1/E1

This feature adds trunk group support for Non-Facility Associated Signaling (NFAS) interfaces. The interfaces should be added as members of a trunk group to control incoming and outgoing call routing. All the interfaces of an NFAS group must belong to the same trunk group. Multiple NFAS groups can belong to the same trunk group with other PRI and BRI interfaces.

Table 3 lists the different voice platforms and their supported trunk group interfaces.

Table 3 Trunk Group Support on Cisco Platforms

Voice Platform	Current T1/E1 Trunk Group Support	Expanded T1/E1/R2 Trunk Group Support	Expanded DS-0 T1/E1 Trunk Group Support	Expanded Voice Port Trunk Group Support
Cisco 1750	ISDN (PRI, BRI)	—	—	—
Cisco 26xx	ISDN(PRI, BRI)	ISDN NFAS-group CAS	Yes	FXS, FXO, E&M, DID

Table 3 Trunk Group Support on Cisco Platforms (continued)

Voice Platform	Current T1/E1 Trunk Group Support	Expanded T1/E1/R2 Trunk Group Support	Expanded DS-0 T1/E1 Trunk Group Support	Expanded Voice Port Trunk Group Support
Cisco 36xx	ISDN(PRI, BRI)	ISDN NFAS-group CAS	Yes	FXS, FXO, E&M, DID
Cisco AS5300	—	ISDN(PRI)* ISDN NFAS-group CAS	—	—
Cisco AS5350	—	ISDN(PRI)* ISDN NFAS-group CAS	—	—
Cisco AS5400	—	ISDN(PRI)* ISDN NFAS-group CAS	—	—
Cisco AS5800	ISDN(PRI)*	ISDN NFAS-group CAS	—	—
Cisco AS5850	—	ISDN(PRI)* ISDN NFAS-group CAS	—	—
Cisco MC3810	ISDN (PRI, BRI)	—	—	—

* BRI is not supported on the Cisco AS5300, Cisco AS5350, Cisco AS5400, Cisco AS5800, and Cisco AS5850 platforms.

The trunk group functionality in this feature does not support the existing trunk group functionality on the Cisco MC3810 and Cisco 1750 platforms.

Hunk Schemes

A hunt scheme is a selection procedure for choosing an interface or voice port. A trunk group with several trunk group members uses a hunt scheme to select an idle channel for routing an outgoing call. Several hunt schemes are supported, as illustrated with the following example.

Suppose a trunk group has three trunk group members: A has the smallest preference value, B has the next highest preference value, and C has the highest preference value. Each hunt scheme impacts the trunk group members as described in the following sections.

Least-Used

The software selects the trunk group member that has the highest number of available channels. This high number indicates that the trunk group member is not used as often as other members. If two or more trunk group members have the same number of idle channels, the one with the highest preference (lowest preference value) is searched first. Once the member is selected, the software searches for an idle channel. Optional parameters can modify the search to look in either ascending or descending order for an even-numbered channel, an odd-numbered channel, or either type.

Suppose **hunt-scheme least-used even down** is enabled. The search goes through the trunk group members in descending order (C, B, A) to determine which member has the highest number of even-numbered idle channels. After selecting that trunk group member, the search looks for an even-numbered idle channel. If successful, the search selects an even-numbered idle channel to use for routing the call. If unsuccessful, the search goes through the trunk group members in the same descending order to select an odd-numbered idle channel. If successful, the search selects an odd-numbered idle channel for routing the call.

Least-Idle

The software searches across all the channels in A, B, and C for the channel that has most recently become available. The precedence of A, B, and C is not important because more than two or more channels cannot be least-idle at the same time. Optional parameters can modify the search to look for an even-numbered channel, an odd-numbered channel, or either type.

Suppose **hunt-scheme least-idle even** is enabled. The software searches for an even-numbered channel that has just entered the available queue. An even-numbered channel in C has just become available. That channel is used for the call routing.

If no even-numbered channel is available, the software searches for the odd-numbered channel with the *longest* idle time instead.

Longest-Idle

The software searches across all the channels in A, B, and C for the channel that has been in the available queue the longest. The precedence of A, B, and C is not important because two or more channels cannot be longest-idle at the same time. Optional parameters can modify the search to look for an even-numbered channel, an odd-numbered channel, or either type.

Suppose **hunt-scheme longest-idle odd** is enabled. The software searches for the odd-numbered channel that has been in the idle queue the longest. An odd-numbered channel in B has been available for the longest time. That channel is used for the call routing.

If no odd-numbered channel is available, the software searches for the even-numbered channel with the *least* (shortest) idle time instead.

Random

The trunk group members are searched in random order for an idle channel.

This method does not account for one member being busier than another and does not intentionally balance the call load across all members. (In the long term, load balancing is achieved across all members.) The search can not be modified for even- or odd-numbered channels or for ascending or descending order.

Round-Robin

The trunk group members are searched in turn for an idle channel. The history of the previously selected member is saved to identify the next trunk group member to use for a new idle channel request. This method tries to balance the load of channel use across the trunk group members.

Optional parameters can modify the search to look for an even-numbered channel, an odd-numbered channel, or either type. The trunk group members are searched in order of preference.

Suppose **hunt-scheme round-robin even** is enabled. Trunk group member A is searched first because it has the highest preference. The search looks for an even-numbered idle channel in A. If one is available, that channel is used for the call routing. A new idle channel request would start with member B, which has the next highest precedence value.

If A does not have an available even-numbered channel, the search tries to find an even-numbered channel in the next highest trunk group member, which is B. If successful, that channel is used for the call routing. A new idle channel request would start with C.

If B does not have any available even-numbered channels, the search tries to find an even-numbered channel in the next highest trunk group member, which is C. If successful, that channel is used for the call routing. A new idle channel request would start with A.

If C has no available even-numbered channels, the search repeats the process to find an odd-numbered channel. In this instance, the search would start again with A.

Sequential

This hunt scheme is similar to round-robin, except that a new idle channel request always starts its search with the highest precedence trunk group member, regardless of the member used for the previous request. In our example, A would always be the first trunk group member searched, even if B was successful the last time.

Optional parameters can modify the search to look in either ascending or descending order for an even-numbered channel, an odd-numbered channel, or either type.

Suppose **hunt-scheme sequential odd down** is enabled. Trunk group member A is searched first because it has the highest precedence value. The search checks A's channels in descending order for an odd-numbered available channel. If successful, the channel is used for the call routing. The next idle channel request starts its search with A.

If A does not have an available even-numbered channel, the search tries to find an even-numbered channel in the next highest trunk group member, which is B. If successful, that channel is used for the call routing. A new idle channel request would start with A.

If B does not have any available even-numbered channels, the search tries to find an even-numbered channel in the next highest trunk group member, which is C. If successful, that channel is used for the call routing. A new idle channel request would start with A.

If C has no available even-numbered channels, the search repeats the process to find an odd-numbered channel. In this instance, the search would start again with A.

Carrier IDs

A *carrier ID* is a new attribute consisting of up to 127 alphanumeric characters that identifies the carrier handling an H.323 or SIP call. One or more trunk groups can refer to the same carrier ID.

To support carrier ID routing, the egress (also called terminating) gateway uses the carrier ID routing tag as a matching key to select an outbound dial peer. In addition, the gateway forwards the call capacity information for the carrier IDs to the gatekeeper connected to a gatekeeper transaction management protocol (GKTMP) server application.

Note Configure the gateway and the network for either carrier ID or trunk group routing. Using them together is not supported and will have unpredictable behavior.

Trunk Group Labels

The gateway trunk and carrier routing enhancements support trunk group routing by enabling a gateway routing tag called *trunk group label*. This new routing tag co-exists with the *carrier ID* gateway routing tag.

Carriers have the option of routing using either the trunk group label or carrier ID.

Note Configure the gateway and the network for either carrier ID or trunk group routing. Using them together is not supported and will have unpredictable behavior.

Additional considerations:

- A trunk group label is a trunk group identifier of up to 127 alphanumeric characters.
- All trunk group labels and carrier IDs must be unique on the gateway. A trunk group label assigned to any trunk group must not match any carrier ID assigned to any trunk group on the gateway.
- Similarly, the source names in a source IP group and in dial-peers must be unique on the gateway. A trunk group label source name must not be the same as any carrier ID source name.

All other aspects of implementing carrier ID routing and trunk group label routing remain the same.

If a carrier ID is not configured for a trunk group, the call capacity reporting uses the trunk group label capacity. The capacity message includes an indication that the capacity's source is a trunk group label.

Number Translation

The gateway trunk and carrier routing enhancements implement translation profiles with translation rules in SED expression format. Trunk groups refer to these profiles for incoming and outgoing call number translation.

The ingress (or originating) gateway uses the translation profile to translate POTS call numbers coming in on a voice port or a trunk group. A voice port matches a single interface, DS-0 group, or analog port; a trunk group matches multiple interfaces, DS-0 groups, or analog ports. If the voice port does not have a translation profile but is a member of a trunk group that does have one, the gateway uses the trunk group's translation profile to translation the call. But if a voice port has a translation profile and is a member of a trunk group, the voice port translation profile overrides the trunk group profile.

A translation profile can be defined for one or more individual controllers, also called *Non-Facility Associated Signaling (NFAS) interfaces*, under voice services. In an NFAS group, all the interfaces share the same voice port, which forces all the interfaces to share the same translation profile. This translation profile translates incoming and outgoing calls on a per-controller basis. When an incoming or outgoing call seizes an NFAS B-channel, the translation profile for the controller overrides the translation profile of the voice port.

Previous number translation schemes performed the number translation *after* matching the incoming call with an inbound dial peer. The new number translation occurs *before* matching the inbound dial peer. Translating the call numbers before matching may affect the selection of an inbound dial peer.

After the incoming call is matched with an inbound dial peer, the translation of the dial peer occurs.

In the egress (or terminating) gateway, new number translation is performed on an incoming H.323 or SIP call using the incoming translation profile of a source IP group or a global VoIP incoming translation profile. If an incoming VoIP call is matched with a source IP group that has an incoming translation profile, the source IP group's profile overrides the global VoIP translation profile.

At the terminating end, the gateway matches the outbound call with an outbound dial peer, using one or more trunk groups as a target. The gateway translates the number using the outgoing translation profile of the outbound dial peer. If the outbound dial peer definition contains a voice port or trunk group, the gateway translates the number again based on the outgoing translation profile of the voice port, NFAS interface, or trunk group.

If the call is not routed successfully and the gateway needs to search for another outbound dial peer, the gateway uses the call number available before any previous outbound dial-peer translations. The call number is translated again based on the subsequent outbound dial-peer.

Multiple Trunk Group Support

Multiple trunk group support permits up to 64 trunk groups to be provisioned as a target in a POTS dial-peer. Because the dial peer can have more than one target destination, this capability reduces the number of dial peers that need to be configured.

During a call setup request for an outbound call, the software searches for an idle channel in an outbound dial peer with a list of trunk groups. The trunk groups are searched sequentially by priority. If an idle channel is not available from the highest priority trunk group, the next priority trunk group is searched. When a channel is found, the trunk group member containing the channel is used for the outbound call.

If the call setup returns a glare condition and the software attempts a retry for the call, the search for another idle channel starts from the beginning of the list of multiple trunk groups.

The following examples illustrate the method for selecting a trunk group.

Example 1

In Example 1, trunk group 11 is searched first because it has the highest priority.

```
dial peer voice 102 POTS
  carrier-id target xyz
  trunkgroup 11 1
  trunkgroup 12 2
  trunkgroup 13 3
  translation-profile outgoing 1
```

Example 2

In Example 2, trunk group 12 has no specified preference, so its priority is assumed to be 0, which is the highest preference. Therefore, trunk group 12 is searched first because it has the highest priority. If an idle channel is not available in trunk group 12, trunk group 11 is searched next.

```
dial peer voice 103 POTS
  carrier-id target xyz
  trunkgroup 12
  trunkgroup 11 1
  trunkgroup 13 2
  translation-profile outgoing 1
```

Example 3

In Example 3, trunk group 12 and trunk group 11 have no specified preference, so their priority is assumed to be 0. But trunk group 12 is searched first because it was configured before trunk group 11. If an idle channel is not available in trunk group 12, trunk group 11 is searched next.

```
dial peer voice 104 POTS
  carrier-id target xyz
```

```
trunkgroup 12
trunkgroup 11
trunkgroup 13 1
translation-profile outgoing 1
```

ENUM Support

The supported implementation of ENUM (E.164 telephone number mapping) for gateway trunk and carrier routing uses a set of user-defined rules to translate the called number into a DNS name for finding an outgoing VoIP dial-peer. Each rule requires a matching pattern, replacement rule, E.164 domain name, and preference number. The rules are collected into a table in order of their preference numbers (the lowest integer is the highest preference).

When a call comes in, the called number is matched against the matching pattern of the rule with the highest preference. If the called number does not match the first rule, the software looks at the rule with the next highest preference. When a match is found, the called number is translated according to the replacement rule. The domain name is concatenated to the translated number. This concatenated number forms the DNS name, which is used to find the URL of the call's destination. (Refer to RFC 2916 for more information on DNS names and searches.)

If the DNS name cannot be associated with a destination URL, the translation process is attempted again using the matching pattern with the next highest preference.

Rules can be entered into a table in any order. Their preference number determines how the software searches through them. The search sequence can be changed easily by changing the preference numbers of the rules.

ENUM supports multiple search tables, each with its own set of rules.

To illustrate how this works, suppose the set of rules in Table 4 defines a match table:

Table 4 ENUM Match Table Entries

Matching Pattern	Replacement Pattern	Domain Name	Preference
/\(.*\)/	/\1/	E164.arpa	6
/^9\(1.*\)/	/+\1/	E164.cisco.com	1
/^9011\(.*\)/	/+1408\1/	E164.arpa	3
/^201\(.*\)/	/+1201\1/	E164.cisco.com	7

The software searches through them in order of preference:

Matching Pattern	Replacement Pattern	Domain Name	Preference
/^9\(1.*\)/	/+\1/	E164.cisco.com	1
/^9011\(.*\)/	/+1408\1/	E164.arpa	3
/\(.*\)/	/\1/	E164.arpa	6
/^201\(.*\)/	/+1201\1/	E164.cisco.com	7

Suppose a call comes in with a called number of "90115325755". The processing sequence is:

1. Compare the number to the matching patterns in the table. It matches the second rule (the one with preference number "3").

2. The replacement pattern translates the number into "+14085325755".
3. The domain name "e164.arpa" is attached to the number to form the DNS name. Using the guidelines of RFC 2916, the DNS name becomes "5.5.7.5.2.3.5.8.0.4.1.e164.arpa".
4. The expanded number is sent to the DNS server handling destination targets.

If this DNS name does not result in a destination URL for the call, the translation process begins again, starting with the third rule (the one with preference number "6").

Source IP Groups

A source IP group is associated with an incoming VoIP call so that the terminating gateway can initiate appropriate services, such as number translation and incoming call control. The source IP group can be identified using one of several possibilities, in the following order of precedence:

- Source carrier ID or Source trunk group label (these two identifiers have the same preference)
- Source zone ID (only for incoming H.323 calls)
- Source IP address—Several source IP addresses can be grouped together in an access list, which is associated with a source IP group.

A maximum of 1000 source IP groups can be configured, if the source IP groups do not include an access list. A maximum of 99 source IP groups can be configured using access lists, because each source IP group must refer to a unique access list numbered between 1 and 99.

Blocking Incoming VoIP Calls using Access Lists

Identifying the source IP group for an incoming VoIP call is done before selecting an inbound dial peer. If the source for the call is found using an access list, the rules that define the access list determine whether the call is accepted or rejected.

If the call is rejected, the gateway returns a default "NO SERVICE" message or a user-specified disconnect cause to the source. The following disconnect causes are supported:

- Invalid-number
- Unassigned-number
- User-busy
- Call-rejected

Number Translation

A source IP group may refer to a translation profile for incoming VoIP call number translation. Even if a global VoIP translation rule is defined, the source IP group's translation profile is used instead.

The terminating gateway performs the number translation *before* matching the call to an inbound dial peer. This is a change from earlier Cisco IOS software releases that performed the number translation after matching the call to an inbound dial peer. Performing the number translation first may affect the results of the inbound dial peer matching.

Calls Originating from Other IP Sources

Source IP groups that refer to carrier IDs have special procedures to handle incoming H.323 calls that do not contain source carrier IDs or target carrier IDs. This situation occurs when a call comes in from a non-Cisco gateway or an IP client.

The terminating gateway tries to identify the source IP group using an IP address or a zone ID. The gateway saves the source and target carrier IDs of the source IP group and sends that information to its gatekeeper.

If the target carrier ID is “null,” the gatekeeper and its GKTMP server application try to find the target carrier ID using the source carrier ID. If the gatekeeper finds the target carrier ID, it sends the target carrier ID back to the gateway. If the gatekeeper cannot find the target carrier ID, it sends a “null” message back to the gateway.

If the terminating gateway receives a “null” message for the target carrier ID, the gateway uses only the destination pattern as the matching key to select an outbound dial peer.

Translation Rules and Translation Profiles

One of the new routing capabilities is the implementation of translation profiles to capture translation characteristics for a set of call numbers. These profiles work with translation rules to provide flexibility in routing calls.

Note Cisco supports old translation rules configured with the **translation-rule** command and new translation rules configured with the **voice translation-rule** and **voice translation-profile** commands. Do not configure a gateway with both old and new translation rules, as this may cause unpredictable behavior.

The configuration sequence for defining translation rules and profiles is:

1. Define one or more translation rules.
2. Define a translation profile that refers to one or more of the translation rules.
3. Associate the translation profile with a group, voice port, interface, or dial peer.

The following sections explain these steps.

Translation Rules

The new set of translation rules has the following attributes:

- Follows SED-like regular expression matching. This feature converts number translation rules and operations in the older format into SED regular expressions.
- Supports escape sequences using backslashes.
- Supports SED-like regular expressions for the keywords “NULL” and “ANY.”
- Supports up to 15 rules per translation rule table.
- Supports up to 128 translation rules.
- Does not support the “|” regular expression character.
- Requires a CTRL-v before entering a “?” in order to save the “?” regular expression symbol as a match pattern.

Note The **rule (voice translation-rule)** command introduced in this feature is a subcommand of the **voice translation-rule** command. An earlier version of this command uses the same name but is a subcommand of the **translation-rule** command and has a slightly different command syntax. Going forward, Cisco recommends that you use this newer version to define rules for call matching. Eventually, the **translation-rule** command will not be supported.

Table 5 illustrates some of the translation rules:

Table 5 Translation Rule Examples

Match Pattern	Replacement Pattern	Input String	Result String	Description
/^$/	/ /			Null string to null string.
/^.*/	/ /	4084552711		Any string to null string.
/^456\(.*\)/	/853\1/	4567123	8537123	Match from the beginning of the input string.
/\(^...\)456\(....\)/	/\1853\2/	4084567777	4088537777	Match from the middle of the input string.
/\(.*\)8920/	/\15555/	4088538920	4088535555	Match from the end of the input string.
/^1#\(.*\)/	/\1/	1#2345	2345	Replace match string with null string.
/^408...\(8333\)/	/853\1/	4087778333	8538333	Match multiple patterns.

Each rule includes a precedence value, a match pattern, a replacement pattern, an optional number type, and an optional number plan. When a rule is invoked, the processing sequence is as follows:

1. The software looks for the rule with the highest precedence value. If the call number matches the match pattern, this rule's replacement pattern is used for the translation. If the call number does not match, the rule with the next highest precedence value is used. This checking continues until a rule is found that matches the call number. A translation rule table can contain a maximum of 15 rules.
2. The call is translated according to the replacement pattern.
3. If the optional number type (or plan) is included in the rule, the call's number and type (or plan) are checked against the match pattern and type (or plan) of the rule with the highest precedence. If both match, this rule is used for the translation. If one of the parameters does not match, the rule with the next highest precedence is checked. After a matching rule is found, the call's number is translated according to the replacement pattern and the type (or plan) is changed according to the rule's replacement type (or plan).

Translation Profiles

A translation profile defines the translation characteristics for a set of calls. Translation profiles associate translation rules for one or more of the following types of call numbers:

- Called
- Calling
- Redirect-called

Each type of call number in the translation profile can reference a different translation rule.

Trunk and carrier based routing supports up to 1000 translation profiles.

Associating a Translation Profile with a Group or Port

After a translation profile is defined, it can be referenced by any of the following:

- Trunk group

  - The trunk group can have two different translation profiles for incoming and outgoing POTS calls.
  - If the trunk group has an outgoing translation profile, the number translation is performed during call setup.
- Source IP group
  - The source IP group can have a translation profile for incoming VoIP calls.
- Dial peer
  - The dial peer can have two different translation profiles for incoming and outgoing calls.
  - If the dial peer has an incoming translation profile, an IVR or session application invokes the number translation during the 2-stage or overlap dialing.
  - If the dial peer has an outgoing translation profile, an IVR or session application invokes the number translation before performing OSP/AAA or call setup.
- Voice port
  - A voice port can have a translation profile for incoming POTS calls. If the voice port is a member of a trunk group, the incoming translation profile of the voice port overrides the translation profile of the trunk group.
  - A voice port can have a translation profile for outgoing POTS calls. If the voice port is a member of a trunk group, the outgoing translation profile of the voice port overrides the translation profile of the trunk group.
- VoIP incoming
  - A global translation profile can be defined to translate all incoming VoIP calls. If an incoming H.323 call is associated with a source IP group that has a defined translation profile, the source IP group's translation profile overrides the global VoIP translation profile.

Incoming Call Blocking

Incoming call blocking is available to POTS, VoIP, VoATM, and VoFR dial peers. The gateway blocks the call during the session and IVR applications after the 2-stage dialing or 1-stage dialing is completed.

To configure incoming call blocking, define a translation rule with a **reject** keyword. For example:

```
voice translation-rule 1
    rule 1 reject /408252*/
```

Apply the rule to a translation profile for called, calling, or redirect-called numbers, such as:

```
voice translation profile call_block_profile
    translate calling 1
```

Include the translation profile within a dial peer definition. For example:

```
dial-peer voice 111 pots
    call-block translation-profile incoming call_block_profile
    call-block disconnect-cause incoming invalid_number
```

In this example, the gateway blocks any incoming TDM (time-division multiplexing) call that successfully matches inbound dial-peer 111 and has a calling number that starts with 408252. The gateway also returns the disconnect cause "invalid number" to the source of the call. (Other disconnect causes can be assigned: unassigned-number, user-busy, or call-rejected.)

Call Detail Record (CDR) Report

The Call Detail Record report has several new attributes.

Number Translations

The Gateway Trunk and Carrier Based Routing feature adds the following attributes to the call active and call history records to resolve billing issues caused by number translations:

- Original called number
- Original calling number
- Original redirect number

GKTMP Server Application Routing

The Gatekeeper Trunk and Carrier Based Routing feature implements carrier sensitive routing functionality through the external GKTMP server application and is closely linked to the Gateway Trunk and Carrier Based Routing feature.

The gatekeeper feature adds the following attributes to the call active and call history records for POTS and VoIP calls:

- Source carrier ID
- Target carrier ID
- Source trunk-group-label
- Target trunk-group-label

Benefits

Streamlined Configuration Process

Customer-defined translation profiles permit dial peers and interfaces to be configured with similar characteristics but without repetitive configuration steps.

Flexible Routing

The gateway trunk and carrier based routing enhancements feature focuses on flexible routing by implementing carrier sensitive routing using incoming and outgoing translation rules.

VoIP routes and POTS routes are treated in a more uniform manner using VoIP source IP groups and POTS trunk groups.

Dial Peer Enhancements for Routing

Trunk groups allow trunks to be grouped under dial peers for routing purposes, permitting more flexibility in doing routing.

Restrictions

Gateway trunk and carrier based routing does not support the following features:

- Statistical routing
- Summary range of numbers in SED regular expressions (this is a SED restriction)

Related Features and Technologies

- Voice over IP (VoIP)
- Gatekeeper Trunk and Carrier Based Routing Enhancements

Related Documents

General reference documents:

- *Cisco IOS Voice, Video, and Fax Configuration Guide*, Release 12.2
- *Cisco IOS Voice, Video, and Fax Command Reference*, Release 12.2

Feature documents:

- *Gatekeeper Trunk and Carrier Based Routing Enhancements*

Supported Platforms

- Cisco 3600 series multiservice platforms
- Cisco AS5300 universal access server
- Cisco AS5350 universal gateway
- Cisco AS5400 universal gateway
- Cisco AS5850 universal gateway

Supported Standards, MIBs, and RFCs

MIBs

- CISCO-VOICE-DIAL-CONTROL-MIB, with modifications to support the following new attributes in the dial peer:
  - Source Trunk Group Label
  - Target Trunk Group Label

To obtain lists of supported MIBs by platform and Cisco IOS release, and to download MIB modules, go to the Cisco MIB website on Cisco.com at the following URL:

http://www.cisco.com/public/sw-center/netmgmt/cmtk/mibs.shtml

RFCs

- RFC 2916, *E.164 number and DNS*
- RFC 2915, *The Naming Authority Pointer (NAPTR) DNS Resource Record*

Prerequisites

- Set up the gateways.
- Prepare a dial plan for the trunk groups and dial peers.
- Prepare translation rules and translation profiles.
- Prepare source IP groups at the terminating gateways.

Configuration Tasks

See the following sections for configuration tasks for this feature. Each task in the list is identified as either required or optional.

- Configuring a Translation Rule (required)
- Verifying the Translation Rule (required)
- Configuring a Translation Profile (optional)
- Configuring an ENUM Match Table (optional)
- Configuring the ENUM Server (required if ENUM Match Table is configured)
- Verifying the ENUM Match Table (optional)
- Configuring a Trunk Group (required)
- Verifying the Trunk Group (optional)
- Configuring a Source VoIP Group (optional)
- Verifying the Source VoIP Group (optional)
- Configuring a Voice Port (optional)
- Verifying the Voice Port (optional)
- Assigning Translation Profiles to Inbound Dial Peers (optional)
- Configuring Call Blocking on Inbound Dial Peers (optional)
- Configuring an Outbound POTS Dial Peer (optional)
- Configuring an Outbound VoIP Dial Peer (optional)
- Verifying the Dial Peer (optional)
- Assigning a Translation Profile to an NFAS Interface (optional)
- Configuring an NFAS Interface (optional)
- Configuring a DS-0 Group (optional)
- Configuring a Global Translation Profile for Incoming VoIP Calls (optional)

Configuring a Translation Rule

Note The **rule (voice translation-rule)** command introduced in this feature is a subcommand of the **voice translation-rule** command. An earlier version of this command uses the same name but is a subcommand of the **translation-rule** command and has a slightly different command syntax. Going forward, Cisco recommends that you use this newer version to define rules for call matching. Eventually, the **translation-rule** command will not be supported.

Gateway trunk and carrier routing enhancements support a maximum of 128 translation rules. Each translation rule supports a maximum of 15 rule definitions. Follow these steps to configure a translation rule, beginning in global configuration mode:

	Command	Purpose
Step 1	`Router(config)# voice translation-rule number`	Initiates a translation rule definition.

Step 2	**Match and Replace Rule**
	`Router(cfg-translation-rule)# rule precedence /match-pattern/ /replace-pattern/ [type {match-type replace-type} plan {match-type replace-type}] | [plan {match-type replace-type}]`
	
	Reject Rule
	`Router(cfg-translation-rule)# rule precedence reject /match-pattern/ [type match-type plan match-type] | [plan match-type]`
		Defines the rule parameters for replacing specific call number patterns. The match pattern and replace pattern are SED expressions.
		
		Defines the rule parameters for rejecting a call number pattern.

Step 3	`Router(cfg-translation-rule)# exit`	Ends the translation rule definition.

Verifying the Translation Rule

Follow these steps to verify the translation rule. Refer to the command descriptions later in this document for sample outputs and their explanation.

Step 1 Enter **show voice translation-rule** to display the characteristics of all translation rules defined on the gateway or the **show voice translation-rule** ***number*** to display a specific translation-rule.

```
Router# show voice translation-rule
```

```
Router# show voice translation-rule 5
```

Step 2 Enter **test voice translation-rule** ***number input-test-string*** with a rule number and an input string to test the functionality of a translation-rule. For example:

```
Router# test voice translation-rule 5 4085251212
```

Configuring a Translation Profile

Gateway trunk and carrier routing enhancements support a maximum of 1000 translation profiles. Follow these steps to define a translation profile. Use at least one of the calling types (called, calling, or redirect-called) in the translation profile, beginning in global configuration mode:

	Command	Purpose
Step 1	`Router(config)# voice translation-profile name`	Initiates the voice translation-profile definition and assigns a name to the profile.
Step 2	`Router(cfg-translation-profile)# translate called translation-rule-number`	(Optional) Associates a translation rule with called numbers.
Step 3	`Router(cfg-translation-profile)# translate calling translation-rule-number`	(Optional) Associates a translation rule with calling numbers.
Step 4	`Router(cfg-translation-profile)# translate redirect-called translation-rule-number`	(Optional) Associates a translation rule with redirected numbers.
Step 5	`Router(cfg-translation-profile)# exit`	Ends the voice translation-profile definition.

Configuring an ENUM Match Table

Follow these steps to configure an ENUM match table for outbound dial peers, beginning in global configuration mode:

	Command	Purpose
Step 1	`Router(config)# voice enum-match-table number`	Initiates the ENUM match table definition.
Step 2	`Router(config-enum)# rule rule-number preference` [`/match-pattern/ /replacement-pattern/ domain-name`]	Defines a rule in SED expression format.

Configuring the ENUM Server

Follow these steps to configure the ENUM server, beginning in global configuration mode:

	Command	Purpose
Step 1	`Router(config)# ip name-server ip-address`	Designates the server with the specified IP address as the ENUM server.

Verifying the ENUM Match Table

Follow these steps to verify an ENUM match table, beginning in privileged EXEC mode. Refer to the command descriptions later in this document for sample outputs and their explanation.

Step 1 Enter **show voice enum-match-table** to display the characteristics of all ENUM match tables defined on the gateway or the **show voice enum-match-table *number*** to display a specific ENUM match table.

```
Router# show voice enum-match-table
```

```
Router# show voice enum-match-table 5
```

Step 2 Enter **test enum *table-number input-pattern*** with a table number and an input pattern to test the functionality of an ENUM match table. The command displays the output pattern for the given input pattern. For example:

```
Router# test enum 2 4085551212
```

Configuring a Trunk Group

Follow these steps to configure a trunk group, beginning in global configuration mode:

	Command	Purpose
Step 1	`Router(config)# trunk group name`	Begins the definition of a trunk group identified by *name*.
Step 2	`Router(config-trunk-group)# carrier-id name`	Specifies the carrier that owns the trunk group.
Step 3	`Router(config-trunk-group)# max-calls {any | data | voice} number [direction in | out]`	Indicates the maximum number of calls that the trunk group can handle.

Step 4	**Least -idle Hunt Scheme**
	`Router(config-trunk-group)# hunt-scheme least-idle [even | odd | both]`
	Least-used Hunt Scheme
	`Router(config-trunk-group)# hunt-scheme least-used [even | odd | both [up | down]]`
	Longest-idle Hunt Scheme
	`Router(config-trunk-group)# hunt-scheme longest-idle [even | odd | both]`
	Random Hunt Scheme
	`Router(config-trunk-group)# hunt-scheme random`
	Round-robin Hunt Scheme
	`Router(config-trunk-group)# hunt-scheme round-robin [even | odd | both [up | down]]`
	Sequential Hunt Scheme
	`Router(config-trunk-group)# hunt-scheme sequential [even | odd | both [up | down]]`
		Specifies the search method for finding an available voice channel in the trunk group.

Step 5	`Router(cfg-source-grp)# description text`	(Optional) Describes the trunk group.
Step 6	`Router(config-trunk-group)# translation-profile incoming name`	Associates a translation profile with incoming calls.

	Command	Purpose
Step 7	`Router(config-trunk-group)# translation-profile outgoing name`	Associates a translation profile with outgoing calls.
Step 8	`Router(config-trunk-group)# exit`	End the trunk group profile definition.

Verifying the Trunk Group

Follow these steps to verify a trunk group definition, beginning in privileged EXEC mode. Refer to the command descriptions later in this document for sample outputs and their explanation.

Step 1 Enter **show trunk group** to display the parameters defined for all trunk groups or **show trunk group *name*** for a specific trunk group identified.

```
Router# show trunk group
```

```
Router# show trunk group westcoast
```

Configuring a Source VoIP Group

Follow these steps to configure a source VoIP group, beginning in global configuration mode:

Note Configure the gateway and the network for either carrier ID or trunk group routing. Using them together is not supported and will have unpredictable behavior.

	Command	Purpose
Step 1	`Router(config)# voice source-group name`	Begins the definition of the VoIP source group.
Step 2	`Router(cfg-source-grp)# access-list number`	Identifies the access list to use to find the source of an incoming VoIP call.

Step 3	**Carrier ID Routing**
	`Router(cfg-source-grp)# carrier-id source name`
	
	Trunk Group Label Routing
	`Router(cfg-source-grp)# trunk-group-label source name`
		Specifies the carrier as the source of an incoming VoIP call.
		
		Specifies the trunk group as the source of an incoming VoIP call.

Step 4	**Carrier ID Routing**
	`Router(cfg-source-grp)# carrier-id target name`
	
	Trunk Group Label Routing
	`Router(cfg-source-grp)# trunk-group-label target name`
		Specifies the carrier as the target of the outgoing POTS call.
		
		Specifies the trunk group as the target of the outgoing POTS call.

Step 5	`Router(cfg-source-grp)# description text`	(Optional) Describes the VoIP source group.
Step 6	`Router(cfg-source-grp)# disconnect-cause reason`	Specifies a reason for blocking calls.

	Command	Purpose
Step 7	`Router(cfg-source-grp)# translation-profile incoming name`	Associates a translation profile with incoming calls.
Step 8	`Router(cfg-source-grp)# h323zone-id name`	(For H.323 calls only) Specifies the zone for an incoming H.323 call.
Step 9	`Router(cfg-source-grp)# exit`	Ends the voice source group profile definition.

Verifying the Source VoIP Group

Follow these steps to verify a source IP group definition, beginning in privileged EXEC mode. Refer to the command descriptions later in this document for sample outputs and their explanation.

Step 1 Enter **show voice source-group** to display the details of all source IP groups or **show voice source-group *name*** to display the details of a specific source IP group. For example:

```
Router# show voice source-group
```

```
Router# show voice source-group abc
```

Step 2 To test the functionality of a source IP group, enter one of the following commands:

- **test source-group carrier-id *name***
- **test source-group h323zone-id *name***
- **test source-group ip-address *ip-address***
- **test source-grouptrunk-group-label source *name***

Configuring a Voice Port

Follow these steps to configure a translation profile for a voice port, beginning in global configuration mode. Include a profile for incoming, outgoing, or both:

	Command	Purpose
Step 1	`Router(config)# voice-port number`	Specifies the voice port to be defined.
Step 2	`Router(config-voiceport)# translation-profile incoming name`	Associates a number translation profile with incoming calls.
Step 3	`Router(config-voiceport)# translation-profile outgoing name`	Associates a translation profile with outgoing calls.
Step 4	`Router(config-voiceport)# trunk-group name [preference]`	Assigns the voice port to a trunk group.
Step 5	`Router(config-)# exit`	Ends the voice port definition.

Verifying the Voice Port

Enter **show voice port *number*** to display the configuration for a specific voice port or **show voice port summary** to display the configurations for all voice ports on the gateway. For example:

```
Router# show voice port
```

```
Router# show voice port summary
```

Refer to the command descriptions later in this document for sample outputs and their explanation.

Assigning Translation Profiles to Inbound Dial Peers

Follow these steps to assign a translation profile to incoming VoIP, VoATM, VoFR, and POTS dial peers, beginning in global configuration mode:

	Command	Purpose
Step 1	`Router(config)# dial-peer voice num [pots | voip | vofr | voatm]`	Creates or modifies a dial peer.
Step 2	`Router(config-dial-peer)# translation-profile incoming name`	Associates a number translation profile with incoming calls.
Step 3	`Router(config-dial-peer)# exit`	Exits the dial peer configuration mode.

Configuring Call Blocking on Inbound Dial Peers

Follow these steps to configure call blocking for inbound POTS and VoIP dial peers, beginning in global configuration mode.

Note Configure the gateway and the network for either carrier ID or trunk group routing. Using them together is not supported and will have unpredictable behavior.

	Command	Purpose
Step 1	`Router(config)# dial-peer voice num [pots | voip | voatm | vofr]`	Creates or modifies a dial peer.
Step 2	`Router(config-dial-peer)# call-block translation-profile incoming name`	Associates a call blocking translation profile for incoming calls. This command is available only for VoIP and POTS dial peers.
Step 3	`Router(config-dial-peer)# call-block disconnect-cause incoming cause`	Specifies a disconnect cause for blocking incoming calls.

	Command	Purpose

Step 4	**Carrier ID Routing**
	`Router(config-dial-peer)# carrier-id source name`
	
	Trunk Group Label Routing
	`Router(config-dial-peer)# trunk-group-label source name`
		Specifies the carrier as the source of an incoming call.
		
		Specifies the trunk group as the source of an incoming call.

Step 5	`Router(config-dial-peer)# exit`	Exits the dial peer configuration mode.

Configuring an Outbound POTS Dial Peer

Follow these steps to assign a translation profile to outbound POTS dial peers, beginning in global configuration mode:

Note Configure the gateway and the network for either carrier ID or trunk group routing. Using them together is not supported and will have unpredictable behavior.

	Command	Purpose
Step 1	`Router(config)# dial-peer voice number pots`	Creates or modifies a dial peer.

Step 2	**Carrier ID Routing**
	`Router(config-dial-peer)# carrier-id target name`
	
	Trunk Group Label Routing
	`Router(config-dial-peer)# trunk-group-label target name`
		Assigns the carrier as the target of the outgoing call.
		
		Assigns the trunk group as the target of the outgoing call.

Step 3	`Router(config-dial-peer)# trunkgroup name [preference]`	Assigns the trunk group to a dial peer. Repeat this command as needed to assign the dial peer to multiple trunk groups.
Step 4	`Router(config-dial-peer)# translation-profile outgoing name`	Assigns a translation profile for outgoing calls.
Step 5	`Router(config-dial-peer)# exit`	Exits the dial peer configuration mode.

Configuring an Outbound VoIP Dial Peer

Follow these steps to configure an outbound VoIP dial peer, beginning in global configuration mode:

	Command	Purpose
Step 1	`Router(config)# dial-peer voice number voip`	Initiates the dial peer definition.
Step 2	`Router(config-dial-peer)# session target enum: table-num`	Specifies an ENUM search table for the target session.
Step 3	`Router(config-dial-peer)# translation-profile outgoing name`	Specifies a translation profile for outgoing calls.
Step 4	`Router(config-dial-peer)# exit`	Ends the dial peer definition.

Verifying the Dial Peer

Enter **show dial-peer voice** *number* to display the configuration for a specific dial peer or **show dial-peer voice summary** to display the configurations for all dial peers on the gateway. For example:

```
Router# show dial-peer voice 110
```

Refer to the command descriptions later in this document for sample outputs and their explanation.

Assigning a Translation Profile to an NFAS Interface

Follow these steps to assign a translation profile to an NFAS interface, beginning in global configuration mode:

	Command	Purpose
Step 1	`Router(config)# voice service pots`	Initiates the voice service POTS definition.
Step 2	`Router(conf-voi-serv)# translation-profile [incoming | outgoing] controller [T1 | E1] unit-number name`	Assigns the translation profile *name* to the NFAS interface.
Step 3	`Router(conf-voi-serv)# exit`	Ends the voice service POTS definition.

Configuring an NFAS Interface

Follow these steps to configure an NFAS interface as a trunk group member, beginning in global configuration mode:

	Command	Purpose
Step 1	`Router(config)# interface serial slot_number`	Initiates the interface configuration mode.
Step 2	`Router(config-if)# trunk-group name [preference_num]`	Assigns the trunk group to the NFAS interface.
Step 3	`Router(config-if)# exit`	Ends the interface configuration mode.

Configuring a DS-0 Group

Follow these steps to configure DS-0 group as a trunk group member, beginning in global configuration mode:

	Command	Purpose
Step 1	`Router(config)# controller {t1 | e1} slot/port`	Initiates the controller configuration mode.
Step 2	`Router(config-if)# trunk-group name [preference_num]`	Assigns the trunk group to the DS-0 group.
Step 3	`Router(config-if)# exit`	Ends the interface configuration mode.

Configuring a Global Translation Profile for Incoming VoIP Calls

Use this command to assign a translation profile to all incoming VoIP calls, beginning in global configuration mode:

	Command	Purpose
Step 1	`Router(config)# voip-incoming translation-profile name`	Assigns the translation profile to all incoming VoIP calls.

Monitoring and Maintaining Gateway Trunk and Carrier Based Routing

To monitor and maintain the gateway trunk and carrier based routing enhancements, use the following commands in privileged EXEC mode:

Command	Purpose
`Router# debug crm`	Displays the Carrier Resource Manager information.
`Router# debug csm tgrm`	Displays the Call Switching Module trunk group resource manager information.
`Router# debug dialpeer`	Displays the dial peer information.
`Router# debug isdn tgrm`	Displays the ISDN trunk group resource manager information.
`Router# debug tgrm`	Displays trunk group resource manager information.
`Router# debug voice enum [detail | summary]`	Displays the ENUM match table information.
`Router# debug voice source-group`	Displays the source IP group information.
`Router# debug voice translation`	Displays the translation-rule information.
`Router# debug voip enum [detail | summary]`	Displays the ENUM match table information.
`Router# show dialplan number dialstring`	Displays the dial peer that is reached when a specific telephone number is dialed.
`Router# show crm`	Displays carrier's call capacities information.
`Router# show trunk group`	Displays the channel status of individual trunk group members.

Configuration Examples

This section provides the following configuration examples:

- Configuring Trunk and Carrier Based Routing on an Originating Gateway
- Configuring Trunk and Carrier Based Routing on a Terminating Gateway

Configuring Trunk and Carrier Based Routing on an Originating Gateway

```
!
version 12.2
no service single-slot-reload-enable
no service pad
service timestamps debug uptime
service timestamps log uptime
no service password-encryption
service internal
!
hostname first
!
!
!
resource-pool disable
!
!
!
!
voice-fastpath enable
ip subnet-zero
no ip domain-lookup
ip host dirt 192.168.254.254
ip name-server 172.20.140.108
!
no ip dhcp-client network-discovery
lcp max-session-starts 0
isdn switch-type primary-5ess
!
voice enum-match-table 1
 rule 1 5 /^9\(1.*\)/ /+\1/ e164.cisco.com
 rule 10 1 /^(.*)/ /\1/ e164.cisco.com
!
voice translation-rule 1
 rule 1 /408/ /804/
 rule 2 /804/ /732/
 rule 3 /875/ /785/
!
voice translation-rule 2
 rule 1 /785/ /786/
 rule 2 /786/ /875/
 rule 3 /732/ /408/
!
voice translation-rule 3
 rule 1 /303/ /330/
 rule 2 /330/ /331/
!
voice translation-rule 4
 rule 1 reject /4087775555/
 rule 2 reject /6503232222/
!
voice translation-profile cb_xrule
 translate called 4
 translate calling 4
 translate redirect-called 4
!
voice translation-profile xrule
 translate calling 1
 translate called 2
 translate redirect-called 3
!
fax interface-type modem
```

```
mta receive maximum-recipients 0
!
controller T1 7/0
 framing sf
 linecode ami
!
controller T1 7/1
 framing esf
 linecode ami
 ds0-group 1 timeslots 1-4 type e&m-fgb dtmf dnis
 ds0-group 2 timeslots 5-8 type e&m-fgb dtmf dnis
 ds0-group 3 timeslots 9-12 type e&m-fgb dtmf dnis
 ds0-group 4 timeslots 13-16 type e&m-fgb dtmf dnis
 ds0-group 5 timeslots 17-20 type e&m-fgb dtmf dnis
 ds0-group 6 timeslots 21-24 type e&m-fgb dtmf dnis
 cas-custom 1
 trunk-group 11
 cas-custom 2
 trunk-group 11
 cas-custom 3
 trunk-group 11
 cas-custom 4
 trunk-group 11
 cas-custom 5
 trunk-group 11
 cas-custom 6
 trunk-group 11
!
controller T1 7/2
 framing esf
 linecode b8zs
 pri-group timeslots 1-24
!
controller T1 7/3
 framing esf
 linecode b8zs
 pri-group timeslots 1-24
!
controller T1 7/4
 framing esf
 linecode b8zs
 pri-group timeslots 1-24 nfas_d primary nfas_int 1 nfas_group 1
!
controller T1 7/5
 framing esf
 linecode b8zs
 pri-group timeslots 1-24 nfas_d none nfas_int 2 nfas_group 1
!
controller T1 7/6
 framing sf
 linecode ami
!
controller T1 7/7
 framing sf
 linecode ami
!
!
interface FastEthernet0/0
 ip address 172.16.50.13 255.255.0.0
 no ip route-cache
 no ip mroute-cache
 duplex auto
 speed auto
!
```

```
interface FastEthernet0/1
 ip address 172.20.140.96 255.255.0.0
 no ip route-cache
 no ip mroute-cache
 duplex auto
 speed auto
!
interface Serial7/2:23
 no ip address
 trunk-group 12
 isdn switch-type primary-5ess
 isdn incoming-voice modem
!
interface Serial7/3:23
 no ip address
 trunk-group 13
 isdn switch-type primary-5ess
 isdn incoming-voice modem
 isdn T310 60000
 no cdp enable
!
interface Serial7/4:23
 no ip address
 trunk-group 13
 isdn switch-type primary-5ess
 isdn incoming-voice modem
 isdn guard-timer 3000
 isdn T306 30000
 isdn T310 10000
 no cdp enable
!
ip classless
ip route 0.0.0.0 0.0.0.0 172.16.0.1
ip route 192.168.254.0 255.255.255.0 FastEthernet0/0
no ip http server
!
trunk group  11
 carrier-id s-mci
!
trunk group  12
 carrier-id s-att
!
trunk group  13
 carrier-id s-sprint
!
voice-port 7/1:1
!
voice-port 7/1:2
!
voice-port 7/1:3
!
voice-port 7/1:4
!
voice-port 7/1:5
!
voice-port 7/1:6
!
voice-port 7/2:D
!
voice-port 7/3:D
!
voice-port 7/4:D
!
dial-peer voice 5108888 voip
```

```
 destination-pattern 510888....
 session protocol sipv2
 session target ipv4:172.16.50.14
!
dial-peer voice 1311 pots
 carrier-id source s-alpha
 call-block disconnect-cause incoming user-busy
 call-block translation-profile incoming cb_xrule
 translation-profile incoming xrule
 direct-inward-dial
!
dial-peer voice 1312 pots
 carrier-id source s-beta
 call-block translation-profile incoming cb_xrule
 translation-profile incoming xrule
!
dial-peer voice 1313 pots
 carrier-id source s-gamma
 call-block translation-profile incoming cb_xrule
 translation-profile incoming xrule
 direct-inward-dial
!
dial-peer voice 510889 voip
 destination-pattern 510889....
 session protocol sipv2
 session target enum:1
!
dial-peer voice 510890 voip
 destination-pattern 510890....
 session target enum:1
!
dial-peer voice 999 voip
 destination-pattern 510........
 session target ipv4:172.16.50.14
!
!
 exec-timeout 0 0
 logging synchronous
line aux 0
 logging synchronous
line vty 0 4
 login
line 1/00 1/107
 no flush-at-activation
 modem InOut
line 3/00 3/107
 no flush-at-activation
 modem InOut
!
scheduler allocate 10000 400
end
```

Configuring Trunk and Carrier Based Routing on a Terminating Gateway

```
!
version 12.2
no service single-slot-reload-enable
```

```
no service pad
service timestamps debug uptime
service timestamps log uptime
no service password-encryption
service internal
!
hostname second
!
!
!
resource-pool disable
dial-tdm-clock  priority 1 freerun
!
!
!
!
voice-fastpath enable
no ip subnet-zero
no ip domain-lookup
ip host dirt 192.168.254.254 255.255.255.0
ip name-server 172.21.188.171
!
no ip dhcp-client network-discovery
lcp max-session-starts 0
isdn switch-type primary-dms100
!
!
!
voice source-group sg-alpha
 carrier-id source s-alpha
 carrier-id target t-alpha
 description route calls from source alpha to target alpha
 translation-profile incoming xrule
!
voice source-group sg-beta
 carrier-id source s-beta
 carrier-id target t-beta
 description route calls from source beta to target beta
 translation-profile incoming xrule
!
voice source-group sg-gamma
 carrier-id source s-gamma
 carrier-id target t-gamma
 description route calls from source gamma to target gamma
 translation-profile incoming xrule
!
voice source-group sg-ip
 access-list 1
 translation-profile incoming xrule
!
voice translation-rule 1
 rule 1 reject /5108880101/
 rule 2 /^510888\(01..\)/ /\10101/
 rule 3 /5108880.../ /5108880101/
!
voice translation-rule 2
 rule 1 /51088802../ /5108880101/
 rule 2 /51088803../ /5108880101/
 rule 3 /510889..../ /5108880101/
 rule 4 /510890..../ /5108880101/
!
voice translation-rule 3
 rule 1 /65088801../ /6508880101/
!
```

```
voice translation-profile xrule
 translate called 1
 translate calling 2
 translate redirect-called 3
!
fax interface-type modem
mta receive maximum-recipients 0
!
trunk activate port-threshold 33
!
controller T1 7/0
 framing sf
 linecode ami
!
controller T1 7/1
 framing esf
 linecode ami
 ds0-group 1 timeslots 1-4 type e&m-fgb dtmf dnis
 ds0-group 2 timeslots 5-8 type e&m-fgb dtmf dnis
 ds0-group 3 timeslots 9-12 type e&m-fgb dtmf dnis
 ds0-group 4 timeslots 13-16 type e&m-fgb dtmf dnis
 ds0-group 5 timeslots 17-20 type e&m-fgb dtmf dnis
 ds0-group 6 timeslots 21 type e&m-fgb dtmf dnis
 ds0-group 7 timeslots 22 type e&m-fgb dtmf dnis
 ds0-group 8 timeslots 23 type e&m-fgb dtmf dnis
 ds0-group 9 timeslots 24 type e&m-fgb dtmf dnis
 ds0 busyout 22-23 hard
 cas-custom 1
 trunk-group 11 1
 cas-custom 2
 trunk-group 11 2
 cas-custom 3
 trunk-group 11 3
 cas-custom 4
 trunk-group 11 4
 cas-custom 5
 trunk-group 11 5
 cas-custom 6
 trunk-group 12 1
 cas-custom 7
 trunk-group 12 2
 cas-custom 8
 trunk-group 12 3
 cas-custom 9
 trunk-group 12 4
!
controller T1 7/2
 framing esf
 linecode b8zs
 pri-group timeslots 1-24 nfas_d primary nfas_int 1 nfas_group 1
!
controller T1 7/3
 framing esf
 linecode b8zs
 pri-group timeslots 1-24 nfas_d none nfas_int 2 nfas_group 1
!
controller T1 7/4
 framing esf
 linecode ami
 ds0-group 1 timeslots 1-4 type e&m-fgb dtmf dnis
 ds0-group 2 timeslots 5-8 type e&m-fgb dtmf dnis
 ds0-group 3 timeslots 9-12 type e&m-fgb dtmf dnis
 ds0-group 4 timeslots 13-16 type e&m-fgb dtmf dnis
 ds0-group 5 timeslots 17-20 type e&m-fgb dtmf dnis
```

```
 ds0-group 6 timeslots 21 type e&m-fgb dtmf dnis
 ds0-group 7 timeslots 22 type e&m-fgb dtmf dnis
 ds0-group 8 timeslots 23 type e&m-fgb dtmf dnis
 ds0-group 9 timeslots 24 type e&m-fgb dtmf dnis
 ds0 busyout 21-22,24 hard
 cas-custom 1
 trunk-group 11  5
 cas-custom 2
 trunk-group 11  6
 cas-custom 3
 trunk-group 11  7
 cas-custom 4
 trunk-group 11  8
 cas-custom 5
 trunk-group 12  5
 cas-custom 6
 trunk-group 12  5
 cas-custom 7
 trunk-group 12  5
 cas-custom 8
 trunk-group 12  5
 cas-custom 9
 trunk-group 12  5
!
controller T1 7/5
 framing esf
 linecode b8zs
 pri-group timeslots 1-24
!
controller T1 7/6
 framing sf
 linecode ami
!
controller T1 7/7
 framing sf
 linecode ami
!
interface FastEthernet0/0
 ip address 172.16.50.14 255.255.0.0
 no ip mroute-cache
 duplex auto
 speed auto
!
interface FastEthernet0/1
 ip address 10.0.0.211 255.0.0.0
 no ip route-cache
 no ip mroute-cache
 shutdown
 duplex auto
 speed auto
!
interface Serial7/2:23
 no ip address
 isdn switch-type primary-dms100
!
ip classless
ip route 0.0.0.0 0.0.0.0 172.16.0.1
ip route 192.168.254.0 255.255.255.0 FastEthernet0/0
ip route 192.168.254.0 255.255.255.0 172.16.0.1
no ip http server
!
access-list 1 permit 172.16.50.12
!
!
```

```
trunk group  11
 carrier-id t-alpha
 hunt-scheme longest-idle
!
trunk group  12
 carrier-id t-alpha
 hunt-scheme least-idle
!
trunk group  13
 carrier-id t-beta
 hunt-scheme random
!
trunk group  14
 carrier-id t-gamma
 hunt-scheme random
!
call rsvp-sync
!
voice-port 7/1:1
!
voice-port 7/1:2
!
voice-port 7/1:3
!
voice-port 7/1:4
!
voice-port 7/1:5
!
voice-port 7/1:6
!
voice-port 7/1:7
!
voice-port 7/1:8
!
voice-port 7/1:9
!
voice-port 7/2:D
!
voice-port 7/4:1
!
voice-port 7/4:2
!
voice-port 7/4:3
!
voice-port 7/4:4
!
voice-port 7/4:5
!
voice-port 7/4:6
!
voice-port 7/4:7
!
voice-port 7/4:8
!
voice-port 7/4:9
!
voice-port 7/5:D
!
mgcp profile default
!
!
dial-peer voice 20001 voip
 carrier-id source alpha
!
```

```
dial-peer voice 20002 voip
 carrier-id source beta
!
dial-peer voice 20003 voip
 carrier-id source gamma
!
dial-peer voice 10001 pots
 trunkgroup 11 1
 trunkgroup 12 2
 translation-profile outgoing 1
 carrier-id target t-alpha
 forward-digits all
!
dial-peer voice 10002 pots
 trunkgroup 13
 translation-profile outgoing 2
 carrier-id target t-beta
!
dial-peer voice 10003 pots
 trunkgroup 14
 translation-profile outgoing 1
 carrier-id target t-gamma
 forward-digits all
!
line con 0
 exec-timeout 0 0
 logging synchronous
line aux 0
 logging synchronous
line vty 0 4
 login
line 1/00 1/107
 no flush-at-activation
 modem InOut
!
scheduler allocate 10000 400
end
```

Command Reference

This section documents new and modified commands. All other commands used with this feature are documented in the Cisco IOS Release 12.2 command reference publications.

New Commands

- **call-block (dial peer)**
- **carrier-id (dial-peer)**
- **carrier-id (trunk group)**
- **carrier-id (voice source group)**
- **debug crm**
- **debug csm tgrm**
- **debug dialpeer**
- **debug isdn tgrm**
- **debug voice enum**
- **debug voice source-group**
- **debug voice translation**
- **debug voip enum**
- **description (voice source group)**
- **h323zone-id (voice source group)**
- **rule (voice translation-rule)**
- **show crm**
- **show trunk group**
- **show voice enum-match-table**
- **show voice source-group**
- **show voice translation-profile**
- **show voice translation-rule**
- **test enum**
- **test source-group**
- **test voice translation-rule**
- **translate (translation profiles)**

Use the following translation-profile commands to assign a translation-profile to the interface.

- **translation-profile (dial-peer)**
- **translation-profile (source group)**
- **translation-profile (trunk group)**
- **translation-profile (voice port)**
- **translation-profile (voice service POTS)**

Use the following trunk-group commands to assign a trunk group to the interface.

- **trunk-group (CAS custom)**

- **trunk-group (voice port)**
- **trunk-group-label (dial-peer)**
- **trunk-group-label (voice source group)**
- **voice enum-match-table**
- **voice source-group**
- **voice translation-profile**

  Use this command to define a translation-profile.
- **voice translation-rule**

  Use this command to define a translation-rule.
- **voip-incoming translation-profile**

  Use this command to define a translation-profile for any incoming VoIP call.

Modified Commands

- **access-list**
- **debug tgrm**
- **description (trunk group)**
- **description (voice source group)**
- **hunt-scheme least-idle**
- **hunt-scheme least-used**
- **hunt-scheme longest-idle**
- **hunt-scheme random**
- **hunt-scheme round-robin**
- **hunt-scheme sequential**
- **max-calls**
- **rule (ENUM configuration)**
- **session target**
- **show dial-peer voice**
- **trunk group**

  Use this command to configure a trunk group.
- **trunkgroup (dial-peer)**

  Use this command to assign a trunk group to a dial peer.
- **trunk-group (interface)**

  Use this command to assign a trunk group to an ISDN or NFAS interface.
- **trunk-group (voice port)**

  Use this command to assign a trunk group to a voice port.

access-list

To assign an IOS access list to a voice source group, use the **access-list** command in voice source-group configuration mode. To delete the access list, use the **no** form of this command.

access-list *access-list-number*

no access-list *access-list-number*

Syntax Description

access-list-number	Number of an access list. This is a decimal number from 1 to 99.

Note Other versions of this command permit access-list-numbers from 1300 to 1999.

Defaults

No default behavior or values

Command Modes

Voice source-group configuration

Command History

Release	Modification
12.2(2)XU	This command was introduced to the voice source group configuration mode.

Usage Guidelines

An access list defines a range of IP addresses for incoming calls that require additional scrutiny. Two related commands are used for voice source groups:

- Use the **access-list** *access-list-number* {**deny** | **permit**} *source* [*source-wildcard*] [**log**] command in global configuration mode to define the contents of the access list.
- Use the **access-list** *access-list-number* command in voice source-group configuration mode to assign the defined access list to the voice source group.

The terminating gateway uses the source IP group to identify the source of the incoming VoIP call before selecting an inbound dial peer. If the source is found in the access list, then the call is accepted or rejected, depending on how the access list is defined.

The terminating gateway uses the access list to implement call blocking. If the call is rejected, the terminating gateway returns a disconnect cause to the source. Use the **disconnect-cause** command to specify a disconnect cause to use for rejected calls.

Use the **show access-lists** EXEC command to display the contents of all access lists.

Use the **show ip access-lis**t EXEC command to display the contents of one access list.

Examples

The following example assigns access list 1 to voice source-group alpha. Access list 1 was defined previously using another command. An incoming source IP group call is checked against the conditions defined for access list 1 and is processed based on the permit or deny conditions of the access list.

```
Router(config)# voice source-group alpha
Router(cfg-source-grp)# access-list 1
```

Related Commands

Command	Description
carrier-id (dial-peer)	Specifies the carrier as the source of incoming VoIP calls (for carrier ID routing).
disconnect-cause	Specifies a cause for blocked calls.
h323zone-id (voice source group)	Associates a zone for an incoming H.323 call.
show access-lists	Displays the contents of all access lists.
show ip access-list	Displays the contents of one access list.
translation-profile (source group)	Associates a translation profile with incoming source IP group calls.
trunk-group-label (voice source group)	Specifies the trunk group as the source of incoming VoIP calls (for trunk group label routing).
voice source-group	Initiates the source IP group profile definition.

call-block (dial peer)

To enable blocking of incoming calls, use the **call-block** command in dial-peer configuration mode. To return to the default value, use the **no** form of this command.

call-block {**disconnect-cause incoming** {**call-reject** | **invalid-number** | **unassigned-number** | **user-busy**} | **translation-profile incoming** *name*}

no call-block {**disconnect-cause incoming** {**call-reject** | **invalid-number** | **unassigned-number** | **user-busy**} | **translation-profile incoming** *name*}

Syntax Description

disconnect-cause incoming	Associates a disconnect cause of incoming calls.
call-reject	Specifies call rejection as the cause for blocking a call during incoming call number translation.
invalid-number	Specifies invalid number as the cause for blocking a call during incoming call number translation.
unassigned-number	Specifies unassigned number as the cause for blocking a call during incoming call number translation.
user-busy	Specifies busy as the cause for blocking a call during incoming call number translation.
translation-profile incoming	Associates the translation profile for incoming calls.
name	Name of the translation profile.

Defaults

Disconnect cause: No Service (once call blocking translation profile is defined)

Translation profile: No default behavior or values.

Command Modes

Dial-peer configuration

Command History

Release	Modification
12.2(2)XU	This command was introduced.

Usage Guidelines

The incoming call can be blocked from the gateway if one of the call (calling, called, or redirect) numbers is matched with the **reject** translation rule of the incoming call blocking translation profile.

The cause value is returned to the source of the call when a call is blocked during the incoming call number translation.

This command is supported in POTS, VoIP, VoFR and VoATM dial peer configuration. For VoATM, only AAL5 type of calls is supported.

Examples

The following example assigns the translation profile westcoast to be used for incoming calls and returns the message “invalid number” as a cause for blocked calls:

```
Router(config)# dial-peer voice 5 pots
Router(config-dial-peer)# call-block translation-profile incoming westcoast
Router(config-dial-peer)# call-block disconnect-cause incoming invalid-number
```

Related Commands

Command	Description
dial-peer voice	Initiates the dial-peer voice configuration mode.
voice translation-profile	Defines a translation profile for voice calls.
voice translation-rule	Defines a translation rule for voice calls.

carrier-id (dial-peer)

To specify the carrier associated with a VoIP call in a dial peer, use the **carrier-id** command in dial-peer configuration mode. To delete the source carrier ID, use the **no** form of the command.

carrier-id [**source** | **target**] *name*

no carrier-id [**source** | **target**] *name*

Syntax Description

source	Indicates the carrier that the dial peer uses as a matching key for inbound dial peer matching.
target	Indicates the carrier that the dial peer uses as a matching key for outbound dial peer matching.
name	Specifies the ID of the carrier to use for the call. Valid carrier IDs contain a maximum of 127 alphanumeric characters.

Defaults

No default behavior or values

Command Modes

Dial-peer configuration

Command History

Release	Modification
12.2(2)XU	This command was introduced.

Usage Guidelines

A gatekeeper transaction management protocol (GKTMP) route server-based application at the terminating gateway uses the source carrier ID to select a target carrier that will route the call over a POTS line.

The terminating gateway uses the target carrier ID to select a dial peer for routing the call over a POTS line.

Examples

The following example indicates that dial peer 112 should use carrier ID east17 for outbound dial peer matching in the terminating gateway:

```
Router(config)# dial-peer voice 112 pots
Router(config-dial-peer)# carrier-id target east17
```

The following example indicates that dial peer 111 should use carrier ID beta23 for inbound dial peer matching in the terminating gateway:

```
Router(config)# dial-peer voice 111 voip
Router(config-dial-peer)# carrier-id source beta23
```

Related Commands

Command	Description
translation-profile (dial-peer)	Associates a translation profile with a dial peer.
trunkgroup (dial-peer)	Assigns a trunk group to a source IP group or dial peer for trunk group label routing.

carrier-id (trunk group)

To specify the carrier associated with a trunk group, use the **carrier-id** command in trunk group configuration mode. To delete the source carrier ID, use the **no** form of the command.

carrier-id *name*

no carrier-id *name*

Syntax Description

name	Specifies the ID of the carrier to use for the call. Valid carrier IDs contain a maximum of 127 alphanumeric characters.

Defaults

No default behavior or values

Command Modes

Trunk group configuration

Command History

Release	Modification
12.2(2)XU	This command was introduced.

Usage Guidelines

In a network, calls are routed over incoming trunk groups and outgoing trunk groups. *name* identifies the carrier that handles the calls for a specific trunk group. In some cases, the same trunk group may be used to carry both incoming calls and outgoing calls.

Examples

The following example indicates that carrier alpha1 carries calls for trunk group 5:

```
Router(config)# trunk group 5
Router(config-trunk-group)# carrier-id alpha1
```

Related Commands

Command	Description
translation-profile (trunk group)	Associates a translation profile with a trunk group.
trunk group	Initiates the definition of a trunk group.

carrier-id (voice source group)

To specify the carrier associated with a VoIP call, use the **carrier-id** command in voice source group configuration mode. To delete the source carrier ID, use the **no** form of the command.

carrier-id [**source** | **target**] *name*

no carrier-id [**source** | **target**] *name*

Syntax Description

source	Indicates the carrier ID associated with an incoming VoIP call at the terminating gateway.
target	Indicates the carrier ID used by the terminating gateway to match an outbound dial peer.
name	Specifies the ID of the carrier to use for the call. Valid carrier IDs contain a maximum of 127 alphanumeric characters.

Defaults

No default behavior or values

Command Modes

Voice source group configuration

Command History

Release	Modification
12.2(2)XU	This command was introduced.

Usage Guidelines

A gatekeeper transaction management protocol (GKTMP) server application at the terminating gateway uses the source carrier ID to select a target carrier that will route the call over a POTS line. The terminating gateway uses the target carrier ID to select a dial peer for routing the call over a POTS line.

Note If an incoming H.323 VoIP call matches a source IP group that has a target carrier ID, then the source IP group's target carrier ID overrides the VoIP call's H.323 setup message.

Examples

The following example indicates that voice source IP group florida should use carrier ID named north3 for incoming VoIP calls and carrier ID named east17 for outbound dial peer matching in the terminating gateway:

```
Router(config)# voice source-group florida
Router(cfg-source-grp)# carrier-id source north3
Router(cfg-source-grp)# carrier-id target east17
```

Related Commands

Command	Description
voice source-group	Initiates the definition of a source IP group.

debug crm

To view Carrier Resource Manager information, use the **debug crm** privileged EXEC command. The **no** form of this command disables debugging output.

debug crm

no debug crm

Syntax Description

This command has no arguments or keywords.

Defaults

Disabled

Command Modes

Privileged EXEC

Command History

Release	Modification
12.2(2)XU	This command was introduced.

Usage Guidelines

Disable console logging and use buffered logging before using the **debug crm** command. Using the **debug crm** command generates a large volume of debugs, which can affect router performance.

Examples

A sample output of the **debug crm** command is shown below.

The output shows that the route label, which will be either a trunk group label or carrier ID, is att1. Mask 1 indicates that it is an incoming voice update. Count type 1 indicates the number of voice calls is being incremented.

```
00:17:53: crm_call_update:route label att1, mask 1, count type 1
00:17:53: crm_call_update:for att1
00:17:53: route label type 1
00:17:53: event type 1
00:17:53: reason for event 0
00:17:53: max capacity mask 0
00:17:53: current capacity mask 1
```

Table 6 provides an alphabetical listing of the **debug crm** command fields and a description of each field.

Table 6 debug crm Field Descriptions

Field	Description
count type	Indicates whether the number of voice calls is being incremented or decremented. 1 = incremented -1 = decremented
current capacity mask	Indicates type of current capacity update from CRM to SPI.
event type	0 = update all carriers 1 = update single carrier
mask	Mask for CRM call update.
max capacity mask	Indicates type of maximum capacity update from CRM to SPI.
reason for event	Reason for this event being sent: 0 = current capacity update 1 = max capacity update 2 = both capacity update 3 = delete carrier
route label	Either the trunk group label or carrier id.
route label type	Indicates the type of trunk. 0 = invalid 1 = TDM 2 = VOIP H323 3 = VOIP SIP 4 = VOIP MGCP 5 = VOIPN2P

Related Commands

Command	Description
max-calls	Specifies the maximum number of calls the trunk group can handle.

debug csm tgrm

To view Call Switching Module trunk group resource manager information, use the **debug csm tgrm** privileged EXEC command. The **no** form of this command disables debugging output.

debug csm tgrm

no debug csm tgrm

Syntax Description

This command has no arguments or keywords.

Defaults

Disabled

Command Modes

Privileged EXEC

Command History

Release	Modification
12.2(2)XU	This command was introduced.

Usage Guidelines

Disable console logging and use buffered logging before using the **debug csm tgrm** command. Using the **debug csm tgrm** command generates a large volume of debugs, which can affect router performance.

Examples

A sample output of the **debug csm tgrm** command is shown below.

The output shows that the call type is voice, the direction is incoming, and the call is accepted by csm.

```
Router#
00:02:25:CSM-TGRM:csm_rx_cas_event_from_neat(EVENT_DIAL_IN) - c(T1 7/1:1:3)
call_type=VOICE, dir=INCOMING
Router#
00:02:30:CSM-TGRM:csm_proc_ic3_wait_for_res_resp() c(T1 7/1:1:3) VOICE <ACCEPTED !!>
```

Table 7 provides an alphabetical listing of the **debug csm tgrm** command fields and a description of each field.

Table 7 debug csm tgrm Field Descriptions

Field	Description
call_type	Type of call: VOICE or MODEM.
dir	Direction of the call: INCOMING or OUTGOING.

debug dialpeer

To view dial peer information, use the **debug dialpeer** privileged EXEC command. The **no** form of this command disables debugging output.

debug dialpeer

no debug dialpeer

Syntax Description

This command has no arguments or keywords.

Defaults

Disabled

Command Modes

Privileged EXEC

Command History

Release	Modification
12.2(2)XU	This command was introduced.

Usage Guidelines

Disable console logging and use buffered logging before using the **debug dialpeer** command. Using the **debug dialpeer** command generates a large volume of debugs, which can affect router performance.

Examples

A sample output of the **debug dialpeer** command is shown below.

The output shows the destination pattern configured on the matched dial-peer. Expanded string is the string after applying number translation to the original number. It shows that dial-peer 1311 was an incoming dial-peer match. It also shows that routing label was att1. It shows that dial-peer 5108888 and 111399 are an outgoing dial-peer match.

```
Router#
00:22:28: Inside dpMatchCore:
00:22:28: destination pattn:5108880101 expanded string:5108880101
00:22:28:MatchNextPeer:Peer 1311 matched
00:22:28: Inside dpMatchCore:
00:22:28: destination pattn:5108880101 expanded string:5108880101
00:22:28: Inside dpMatchCore:
00:22:28: destination pattn:4088880101 expanded string:4088880101
00:22:28: Inside dpMatchCore:
00:22:28: destination pattn:4088880101 expanded string:4088880101
00:22:28: dpAssociateIncomingPeer_T:Matching route label att1
00:22:28: Inside dpMatchCore:
00:22:28: destination pattn:5108880101 expanded string:5108880101
00:22:28: dpAssociateIncomingPeer_T:Matching peer with src route label att1 failed
00:22:28: Inside dpMatchCore:
00:22:28: destination pattn:5108880101 expanded string:5108880101
00:22:28:MatchNextPeer:Peer 1311 matched
00:22:28: Inside dpMatchPeersMoreArg
00:22:28:dpMatchPeersMoreArg:Match Dest. pattern; called (5108880101)
00:22:28: Inside dpMatchCore:
```

```
00:22:28: destination pa
Router#ttn:5108880101 expanded string:5108880101
00:22:28:MatchNextPeer:Peer 5108888 matched
00:22:28:MatchNextPeer:Peer 111399 matched
00:22:28:dpMatchPeersMoreArg:Result=0 after MATCH_ORIGINATE
```

Table 8 provides an alphabetical listing of the **debug dialpeer** command fields and a description of each field.

Table 8 debug dialpeer Field Descriptions

Field	Description
destination pattn	Destination pattern configured on the dial peer.
expanded string	The string after applying number translation to the original number.
Match Dest. pattern; called	Indicates that dial-peer match is going to match destination pattern against the called number.
Matching route label	The trunk group label or carrier id that is used for matching a dial peer.
MatchNextPeer	Indicates the dial peer tag that matched.
Result	Indicates the result of dial peer matching algorithm: 0 = successful 1 = more digits needed for a possible match -1 = no match (match failed) -2 = the digits matched, but the destination address could not be obtained

Related Commands

Command	Description
call-block (dial peer)	Enables blocking of incoming calls on the dial peer.
carrier-id (dial-peer)	Identifies the carrier handling the incoming call.
session target	Specifies the ENUM search table for the target session.
show dial-peer voice	Displays the configuration of the dial peer.
translation-profile (dial-peer)	Assigns a translation profile to the dial peer.
trunkgroup (dial-peer)	Assigns a trunk group to the dial peer.
trunk-group-label (dial-peer)	Identifies the trunk group handling the incoming call.

debug isdn tgrm

To view ISDN trunk group resource manager information, use the **debug isdn tgrm** privileged EXEC command. The **no** form of this command disables debugging output.

debug isdn tgrm

no debug isdn tgrm

Syntax Description

This command has no arguments or keywords.

Defaults

Disabled

Command Modes

Privileged EXEC

Command History

Release	Modification
12.2(2)XU	This command was introduced.

Usage Guidelines

Disable console logging and use buffered logging before using the **debug isdn tgrm** command. Using the **debug isdn tgrm** command generates a large volume of debugs, which can affect router performance.

Examples

A sample output of the **debug isdn tgrm** command is shown below.

The output shows that the channel used (bchan) is 1, service state is 0 (in-service), call_state is 2 (busy), "false busy" is 0, and dsl is 2. The output also shows that the bchannel is 1, the channel is available and call state is transitioned from 0 (idle) to 2 (busy).

The third line of output shows that bchan is 1, call state is 1 (busy), call type is 2 (voice), and call direction is 1 (incoming).

```
00:26:31:ISDN:get_tgrm_avail_state:idb 0x64229380 bchan 1 service_state 0 call_state 2
false busy 0x0 dsl 2
00:26:31:ISDN:update_tgrm_call_status:idb 0x64229380 bchan 1 availability state 1 call
state(prev,new) (0,2), dsl 2
00:26:31:ISDN:Calling TGRM with tgrm_call_isdn_update:idb 0x64229380 bchan 1 call state 1
call type 2 call dir 1
```

Table 9 provides an alphabetical listing of the **debug isdn tgrm** command fields and a description of each field.

Table 9 debug isdn tgrm Field Descriptions

Field	Description
availability state	Indicates whether the channel is available: 0 = not available 1 = available
bchan	Bearer channel used for this call.
call dir	Direction of the call: 0 = incoming 1 = outgoing
call_state	State of the call. It has different values depending on whether it is from ISDN perspective or TGRM perspective. When printed from get_tgrm_avail_state(), it is the state value from ISDN perspective: 0 = idle 1 = negotiate 2 = busy 3 = reserved 4 = restart pending 5 = maintenance pend 6 = reassigned When printed from tgrm_call_isdn_update(), it is the state value from TGRM perspective: 0 = idle 1 = busy 2 = pending 3 = reject
call state (prev, new)	Indicates the state transition of the call. The state values are as shown in call_state from the ISDN perspective.
call type	Type of call: 0 = invalid 1 = data 2 = voice 3 = modem 4 = none
dsl	Internal interface identifier.
false busy	Bit map of all the channels on the interface indicating their soft busy status.
idb	Address of the IDB for the interface.
service_state	Service state: 0 = in-service 1 = maintenance 2 = out of service

Related Commands

Command	Description
show trunk group	Displays the configuration of the trunk group.
translation-profile (voice service POTS)	Assigns a translation-profile to the interface.
trunk-group (interface)	Assigns a trunk group to the interface.

debug tgrm

To display debug messages for all trunk groups, use the **debug tgrm** privileged EXEC command. The **no** form of this command disables debugging output.

debug tgrm

no debug tgrm

Syntax Description

This command has no arguments or keywords.

Defaults

Disabled

Command Modes

Privileged EXEC

Command History

Release	Modification
12.1(3)T	This command was introduced.
12.2(2)XU	The output was modified for trunk group profiles.

Usage Guidelines

Disable console logging and use buffered logging before using the **debug tgrm** command. Using the **debug tgrm** command generates a large volume of debugs, which can affect router performance.

Examples

A sample output of the **debug tgrm** command is shown below. The comments are included to describe the output. Blank lines are inserted for readability. The fields are described in Table 10 following the output.

The following output comes from an originating gateway (OGW) whose call handling voice port does not belong to a trunk group.

```
tahoe4#debug tgrm
!A call comes in.
*Jan  1 00:04:12.091: TGRM: tgrm_call_update: inputs received by TGRM; status=2
call_type=2 direction=1

!The voice port is checked for membership in a trunk group.
*Jan  1 00:04:12.091: TGRM: tgrm_tg_member_trunk: Membership check failed;
tgrm_cause=2
*Jan  1 00:04:12.091: TGRM: tgrm_call_update: membership check failed
Router#

!The call is accepted even though the voice port does not belong to a trunk group.
*Jan  1 00:04:17.471: TGRM: tgrm_accept_call ( timeslot=4 call_type=VOICE
call_direction=INCOMING slot=0 sub_unit=65535 port=0 ds0_group=1 )
*Jan  1 00:04:17.471: TGRM: tgrm_accept_call - Interface does not belong to a
trunk group Call accepted.
Router#
```

```
!The call is processed and the caller disconnects the call.
*Jan  1 00:04:23.503: TGRM: tgrm_call_update: inputs received by TGRM; status=0
call_type=4 direction=3
*Jan  1 00:04:23.503: TGRM: tgrm_tg_member_trunk: Membership check failed;
tgrm_cause=2
*Jan  1 00:04:23.503: TGRM: tgrm_call_update: membership check failed
```

The following output comes from an originating gateway (OGW) whose voice port where the call entered does not belong to a trunk group.

```
Router#debug tgrm
TGRM detailed info debugging is on
Router#
! A call comes in.
*Jan  1 00:08:05.407: TGRM: tgrm_call_update: inputs received by TGRM; status=2
call_type=2 direction=1

! A channel is reserved and call counters are updated. This occurs because the voice port
is a trunk group member.
*Jan  1 00:08:05.407: TGRM: tgrm_trunk_channel_pending (trunk=0x625B866C channel=1
direction=INCOMING) TG label=11
*Jan  1 00:08:05.407: TGRM: tgrm_tg_call_count_update_crm: type=VOICE dir=INCOMING
increment=1
*Jan  1 00:08:05.407: TGRM: tgrm_tg_get_carrier_id: carrier_id=11
Router#

! An attempt is made to place the call. The trunks are searched for an idle channel and
the maximum call threshold is checked to determine if the call is allowed.
*Jan  1 00:08:10.787: TGRM: tgrm_accept_call ( timeslot=1 call_type=VOICE
call_direction=INCOMING slot=0 sub_unit=65535 port=0 ds0_group=1 )
*Jan  1 00:08:10.787: TGRM: tgrm_trunk_channel_active (trunk=0x625B866C channel=1
call_type=VOICE dir=INCOMING) TG label=11
*Jan  1 00:08:10.787: TGRM: tgrm_trunk_channel_active: channel is being moved from pending
to active; channel=1
*Jan  1 00:08:10.787: TGRM: tgrm_tg_call_count_update_no_crm: count_type=TGRM_COUNT_VOICE
dir=INCOMING increment=1
*Jan  1 00:08:10.787: TGRM: tgrm_allow_call (tg_info=0x625E6050 TG label=11
call_type=VOICE call_direction=INCOMING)
Router#

! The call is allowed. Updated counts go to crm, which sends a message to the H.323
gatekeeper to place the call. The call is placed and the caller disconnects the call.
*Jan  1 00:08:16.823: TGRM: tgrm_call_update: inputs received by TGRM; status=0
call_type=4 direction=3
*Jan  1 00:08:16.823: TGRM: tgrm_trunk_channel_idle (trunk=0x625B866C channel=1) TG
label=11
*Jan  1 00:08:16.823: TGRM: tgrm_trunk_channel_idle: BUSY=1 [channel]=0x0 pend=0 act=1
*Jan  1 00:08:16.823: TGRM: tgrm_tg_call_count_update: dir=INCOMING increment=0
*Jan  1 00:08:16.823: TGRM: tgrm_tg_call_count_update_no_crm: count_type=TGRM_COUNT_VOICE
dir=INCOMING increment=0
*Jan  1 00:08:16.823: TGRM: tgrm_tg_call_count_update_crm: type=VOICE dir=INCOMING
increment=0
*Jan  1 00:08:16.823: TGRM: tgrm_tg_get_carrier_id: carrier_id=11
Router#
*Jan  1 00:08:16.823: TGRM: trunk->l2 1 parent 625E6050
```

The following output comes from a terminating gateway (TGW) where the trunk group is configured on the dial-peer.

```
Router#debug tgrm
! Checks if the call is allowed by this trunk group.
*Jan  9 22:37:29.120: TGRM: tgrm_allow_call (tg_info=0x64324B58 TG label=711
call_type=VOICE call_direction=OUTGOING)
```

```
*Jan  9 22:37:29.120: TGRM:tgrm_select_by_state - tgTag=711

! Makes sure the trunk group has some members.
*Jan  9 22:37:29.120: TGRM: tgrm_get_first_trunk: tg_info=0x64324B58

! Checks for an idle timeslot from the selected trunk group.
*Jan  9 22:37:29.120: TGRM:tgrm_select_idle_trunk - tg=0x64324B58

! Starts looking for the idle timeslot beginning with the first trunk member.
*Jan  9 22:37:29.120: TGRM: tgrm_get_first_trunk: tg_info=0x64324B58

! Iterates over the members of the trunk looking for an idle timeslot.
*Jan  9 22:37:29.124: TGRM:tgrm_select_trunk_loop -
tg=0x64324B58,tgm=0x64324D68,qualifier=9
*Jan  9 22:37:29.124: TGRM: tgrm_select_trunk_loop - tgTag=711,tgmPref=65

! Finds an idle timeslot from the trunk group member.
*Jan  9 22:37:29.124: TGRM: tgrm_find_idle_timeslot - tgm=0x64324D68,hunt=0,qualifier=9

! Finds the number of odd timeslots available, in this case 2.
*Jan  9 22:37:29.124: TGRM: tgrm_trunk_num_idle_channel - tgm=0x64324D68,#idle=2
*Jan  9 22:37:29.124: TGRM: tgrm_trunk_num_idle_channel - tgm=0x64324D68,#idle=2

! Checks if the trunk group member is ready to handle outgoing calls.
*Jan  9 22:37:29.124: TGRM: tgrm_tgm_is_ready_outgoing: tgm=0x64324D68
*Jan  9 22:37:29.124: TGRM: tgrm_tgm_is_ready_outgoing - Success! tgm(pref#=65) for voice
call

! Goes over each of the timeslots in the trunk and checks if the timeslot is idle. If a
! timeslot meeting our criteria (hunt scheme + qualifier) is idle, selects it.
*Jan  9 22:37:29.124: TGRM: tgrm_get_timeslot_by_order - tgm=0x64324D68,hunt
qualifier=9,tslot=1
*Jan  9 22:37:29.124: TGRM: tgrm_timeslot_is_idle - tgm=0x64324D68,timeslot=0x1

! Goes to the next trunk group member, in case it has the most number of idle channels.
*Jan  9 22:37:29.124: TGRM: tgrm_get_next_trunk - tgm=0x64324D68,hunt qualifier=9

! Repeats the process of finding idle timeslots, determining if the timeslot is
! available for placing outoing calls, and selecting an idle timeslot.
*Jan  9 22:37:29.124: TGRM: tgrm_find_idle_timeslot - tgm=0x6427B19C,hunt=0,qualifier=9
*Jan  9 22:37:29.124: TGRM: tgrm_trunk_num_idle_channel - tgm=0x6427B19C,#idle=2
*Jan  9 22:37:29.124: TGRM: tgrm_trunk_num_idle_channel - tgm=0x6427B19C,#idle=2
*Jan  9 22:37:29.124: TGRM: tgrm_tgm_is_ready_outgoing: tgm=0x6427B19C
*Jan  9 22:37:29.124: TGRM: tgrm_tgm_is_ready_outgoing - Success! tgm(pref#=65) for voice
call
*Jan  9 22:37:29.124: TGRM: tgrm_get_timeslot_by_order - tgm=0x6427B19C,hunt
qualifier=9,tslot=5
*Jan  9 22:37:29.124: TGRM: tgrm_timeslot_is_idle - tgm=0x6427B19C,timeslot=0x5
*Jan  9 22:37:29.124: TGRM: tgrm_get_next_trunk - tgm=0x6427B19C,hunt qualifier=9

! Successfully returned from the loop where all trunk group members were checked.
*Jan  9 22:37:29.124: TGRM:tgrm_select_trunk_loop - Success! selected
trunk=0x64324D68,tslot=1
*Jan  9 22:37:29.124
Router#:

! Reserves this channel for the call by placing it in pending state.
TGRM: tgrm_trunk_channel_pending (trunk=0x64324D68 channel=1 direction=OUTGOING) TG
label=711

! Obtains the carrier ID and updates CRM about the outgoing call.
*Jan  9 22:37:29.124: TGRM: tgrm_tg_call_count_update_crm: type=VOICE dir=OUTGOING
increment=1
*Jan  9 22:37:29.124: TGRM: tgrm_tg_get_carrier_id: carrier_id=711
```

```
! Successfully reserves the intended timeslot.
*Jan  9 22:37:29.124: TGRM:tgrm_select_by_state() - Success! Reserved
tgTag=711,tgmPref#=65,Ts=1

! Selects timeslot.
*Jan  9 22:37:29.124: TGRM: tgrm_select_interface: selected
pIF=0x63E7E690,timeslot=1,dsl=-1

! The call is placed and caller disconnects the call.
*Jan  9 22:37:30.024: TGRM: tgrm_call_update: inputs received by TGRM; status=0
call_type=4 direction=3
*Jan  9 22:37:30.024: TGRM: tgrm_trunk_channel_idle (trunk=0x64324D68 channel=1) TG
label=711
*Jan  9 22:37:30.024: TGRM: tgrm_trunk_channel_idle: BUSY=1 [channel]=0x0 pend=1 act=0
*Jan  9 22:37:30.024: TGRM: tgrm_trunk_channel_idle: timeslot had pending flag timeslot=1
```

Table 10 provides an alphabetical listing of the **debug tgrm** command fields and a description of each field.

Table 10 debug tgrm Field Descriptions

Field	Description
act	Active state 0 = no active call on the channel 1 = active call on the channel
BUSY	Busy state of the channel 0 = idle 1 = busy
call_direction	Direction of the call: INCOMING OUTOING NONE
carrier ID	ID of the carrier that is handling the call.
call_type	Type of call. This value is not sent to CRM and is displayed as either a numeric or alphabetic value: 0 = INVALID 1 = DATA 2 = VOICE 3 = MODEM 4 = NONE
channel	Timeslot number on which the call is coming in or going out.
count_type	Type of call count, used to increment the maximum call counter. CRM is not updated with this number. Valid values are: TGRM_COUNT_VOICE TGRM_COUNT_DATA
dir	Direction of the call. This value is reported to CRM, which sends it to H.323, which alerts the gatekeeper. Valid values are: INCOMING OUTGOING

Table 10 debug tgrm Field Descriptions (continued)

Field	Description
direction	Direction of the call. This value is displayed as either a numeric or alphabetic value: 1 = INCOMING 2 = OUTGOING 3 = NONE
dsl	ISDN DSL number. Significant only for ISDN calls.
ds0_group	ID of the T1 trunk.
hunt	Hunt scheme: 0 = default (user has not configured anything - uses least-used) 1 = least-used 2 = round-robin 3 = sequential 4 = least-idle 5 = longest-idle 6 = random
hunt qualifier	Same as **qualifier**.
#idle	Number of idle channels.
increment	Increases the call count. Valid values are 0 or 1.
parent	Trunk group to which the trunk group member belongs.
pend	Pending state: 0 = no calls pending 1 = a call is pending on the channel
port	ID of the T1 trunk.
pref#	Preference assigned to the trunk group member within the trunk group. Default value is 65 (user has not configured anything). Same as **tgmPref**.
qualifier	Indicates the qualifier for the hunt scheme: 0 = both none 1 = both up 2 = both down 3 = even none 4 = even up 5 = even down 6 = odd none 7 = odd up 8 = odd down 9 = default (user has not configured anything - uses 1 both up)
selected trunk	Trunk group member that has been selected for the outgoing call.
slot	ID of the T1 trunk slot number.

Table 10 debug tgrm Field Descriptions (continued)

Field	Description
status	Status of the call: 0 = idle 1 = busy 2 = pending 3 = rejected
subunit	ID of the T1 trunk subunit.
tg_info	Trunk group's location in memory.
TG label	Trunk group name.
tgm	Trunk group member's location in memory.
tgmPref	Preference assigned to the trunk group member within the trunk group. Default value is 65 (user has not configured anything). Same as **pref#**.
tgTAG	Trunk group label.
timeslot	Timeslot on which the call is coming in or going out.
trunk	Trunk group member's location in memory.
Ts	Same as **timeslot**.
tslot	Same as **timeslot** and **channel**.
type	Call type used to alert CRM, which sends the value to H.323, which sends it to the gatekeeper. Modem calls are counted as voice calls for reporting to CRM. Valid values are: VOICE DATA

Related Commands

Command	Description
carrier-id (trunk group)	Specifies the carrier that owns the trunk group.
hunt-scheme least-idle **hunt-scheme least-used** **hunt-scheme longest-idle** **hunt-scheme random** **hunt-scheme round-robin** **hunt-scheme sequential**	Specifies the search method for finding an available voice channel in the trunk group.
max-calls	Indicates the maximum number of callsthat the trunk group can handle.
show trunk group	Displays the configuration of the trunk group.
translation-profile (trunk group)	Assigns a translation-profile to the trunk group.
trunk group	Initiates the definition of a trunk group.

debug voice enum

To view voice enum information, use the **debug voice enum** privileged EXEC command. The **no** form of this command disables debugging output.

debug voice enum {**detail** | **summary**}

no debug voice enum {**detail** | **summary**}

Syntax Description

detail	Displays detailed output.
summary	Displays summary output.

Defaults

Disabled

Command Modes

Privileged EXEC

Command History

Release	Modification
12.2(2)XU	This command was introduced.

Usage Guidelines

Disable console logging and use buffered logging before using the **debug voice enum** command. Using the **debug voice enum** command generates a large volume of debugs, which can affect router performance.

Examples

A sample output of the **debug voice enum detail** command is shown below.

The output shows the match number as 5108891234, enum table as 10. Rule 1 in table 10 matched the pattern and after applying the replacement rule, the resulting string is 5108891234. The enum query is sent out for the domain 4.3.2.1.9.8.8.0.1.5.e164.cisco.com. The output then shows the matching NAPTR records obtained in the response. The records are then processed and the final URLs (contact lists) are shown towards the end.

```
Router#enum_resolve_domain:match_num 5108891234 table_indx 10
enum_resolve_domain:rule 1 result string 5108891234
generate_enum_search_string :search string 4.3.2.1.9.8.8.0.1.5.e164.cisco.com
enum_dns_query:name = 4.3.2.1.9.8.8.0.1.5.e164.cisco.com type = 35, ns_server = 0
order 100 pref 10 service sip+E2U flag U
regexp /^.*$/sip:510889l234@1.8.50.14/ replacement
order 200 pref 10 service h323+E2U flag U
regexp /^.*$/h323:5555@1.5.1.1/ replacement
num_elem = 2
NAPTR Record :order 100 pref 10 servi
tahoe13#ce sip+E2U
               flags U regexp /^.*$/sip:5108891234@1.8.50.14/
               replacement
NAPTR Record :order 200 pref 10 service h323+E2U
               flags U regexp /^.*$/h323:5555@1.5.1.1/
               replacement
```

```
decode_naptr_record :re_string ^.*$
decode_naptr_record :re_substitution_string sip:5108891234@1.8.50.14
decode_naptr_record :re_flags_string
U_FLAG case, stopping query
new_e164_user sip:5108891234@1.8.50.14
decode_naptr_record :re_string ^.*$
decode_naptr_re
tahoe13#cord :re_substitution_string h323:5555@1.5.1.1
decode_naptr_record :re_flags_string
U_FLAG case, stopping query
new_e164_user h323:5555@1.5.1.1
contact_list :
              sip:5108891234@1.8.50.14
contact_list :
              h323:5555@1.5.1.1
enum_resolve_domain:contact_list 64558450
```

A sample output of the **debug voice enum summary** command is shown below.

The output shows the matching number, the enum table used and the rule in the table that matched the number along with the resulting string. Note that this output is a subset of the output from **debug voice enum detail** command.

```
Router#enum_resolve_domain:match_num 5108891234 table_indx 10
enum_resolve_domain:rule 1 result string 5108891234
```

Table 11 provides an alphabetical listing of the **debug voice enum** command fields and a description of each field.

Table 11 debug voice enum Field Descriptions

Field	Description
contact_list	Final list of URLs that the gateway will try to contact as an attempt to place the call.
flag	Flag value of a NAPTR record as defined in RFC 2915.
match_num	Number to be used for matching against the enum match table.
name	Fully qualified domain name sent out to DNS server
ns_server	Address of the DNS server. If 0, the DNS server configured on the gateway is used.
num_elem	Number of records received in the response.
order	Order in the record, as defined in RFC2915.
pref	Preference of the record, as defined in RFC2915.
regexp	Regular expression of the record, as defined in RFC2915.
replacement	Replacement string of the record, as defined in RFC2915.
re_flags_string	Flag indicating whether matching and replacement should be case sensitive: i = case insensitive otherwise = case sensitive
re_string	The first part of the regexp, delimited by "/". This is used to match the incoming string. See RFC2915.
re_substitution_string	The second part of regexp, delimited by "/".

Table 11 debug voice enum Field Descriptions (continued)

Field	Description
result string	String that results when match_num is taken through the enum match table for a match. This string will be used to form a FQDN.
rule	Rule number that matched match_num in the enum match table.
search string	String sent out to the DNS server.
service	Service field of the NAPTR record. See RFC2915.
table_indx	Index of the enum match table picked for this call.
type	Type of record requested in the query: 35 = NAPTR 33 = SRV

Related Commands

Command	Description
rule (ENUM configuration)	Defines the rule pattern for an ENUM match table.
show voice enum-match-table	Displays the ENUM match table rules.
test enum	Tests the ENUM match table rules.
voice enum-match-table	Initiates the ENUM match table definition.

debug voice source-group

To view voice source group information, use the **debug voice source-group** privileged EXEC command. The **no** form of this command disables debugging output.

debug voice source-group

no debug voice source-group

Syntax Description

This command has no arguments or keywords.

Defaults

Disabled

Command Modes

Privileged EXEC

Command History

Release	Modification
12.2(2)XU	This command was introduced.

Usage Guidelines

Disable console logging and use buffered logging before using the **debug voice source-group** command. Using the **debug voice source-group** command generates a large volume of debugs, which can affect router performance.

Examples

A sample output of the **debug voice source-group** command is shown below.

The output shows that the hash table key for source ip group is 1.

```
00:30:49:SIPG:sipg_get() - idString=0x63BE1C28, hashkey=1
00:30:49:SIPG:sipg_find_key - hashkey=1,idstring=0x63BE1C28
```

Table 12 provides an alphabetical listing of the **debug voice source-group** command fields and a description of each field.

Table 12 debug voice source-group Field Descriptions

Field	Description
hashkey	Hash table index of the source IP group.
idString	Value of the pointer to the source IP group name, which is used to make sure that it is not null.

Related Commands

Command	Description
carrier-id (voice source group)	Specifies the carrier handling incoming source VoIP calls (for carrier ID routing).
show voice source-group	Displays the details of one or more source IP groups.

Command	Description
test source-group	Tests the definition of a source IP group.
translation-profile (source group)	Associates a translation profile with the source IP group.
trunk-group-label (voice source group)	Specifies the trunk group handling incoming source VoIP calls (for trunk group label routing).
voice source-group	Initiates the source IP group definition.

debug voice translation

To view voice translation rule information, use the **debug voice translation** privileged EXEC command. The **no** form of this command disables debugging output.

debug voice translation

no debug voice translation

Syntax Description

This command has no arguments or keywords.

Defaults

Disabled

Command Modes

Privileged EXEC

Command History

Release	Modification
12.2(2)XU	This command was introduced.

Usage Guidelines

Disable console logging and use buffered logging before using the **debug voice translation** command. Using the **debug voice translation** command generates a large volume of debugs, which can affect router performance.

Examples

A sample output of the **debug voice translation** command is shown below.

The output shows the details of the original number following regxrule_profile_translate.

Following regxrule_profile_match, the output shows that rule 1 in the translation rule 1001 was a match, then the details of the SED substitution are shown.

Then the output shows the details of the translated number following regxrule_profile_translate.

In this example, since there was no called number or redirect number translation configured on the translation profile, corresponding errors were generated with a message that no match was found.

Following regxrule_dp_translate, the output indicates that there is no translation profile for outgoing direction, then it prints the numbers sent to the outgoing SPI.

```
Router#
00:51:56:regxrule_get_profile_from_trunkgroup:Voice port 0x64143DA8 does not belong to any
trunk group
00:51:56:regxrule_get_profile_from_trunkgroup:Voice port 0x64143DA8 does not belong to any
trunk group
00:51:56:regxrule_stack_pop_RegXruleNumInfo:stack=0x63DECAF4; count=1
00:51:56:regxrule_stack_push_RegXruleNumInfo:stack=0x63DECAF4; count=0
00:51:56:regxrule_profile_translate:number=4088880101 type=unknown plan=unknown
numbertype=calling
00:51:56:regxrule_profile_match:Matched with rule 1 in ruleset 1001
00:51:56:regxrule_profile_match:Matched with rule 1 in ruleset 1001
```

```
00:51:56:sed_subst:Successful substitution; pattern=4088880101 matchPattern=^.*
replacePattern=5551212 replaced pattern=5551212
00:51:56:regxrule_subst_num_type:Match Type = none, Replace Type = none Input Type =
unknown
00:51:56:regxrule_subst_num_plan:Match Plan = none, Replace Plan = none Input Plan =
unknown
00:51:56:regxrule_profile_translate:xlt_number=5551212 xlt_type=unknown xlt_plan=unknown
00:51:56:regxrule_profile_translate:number= type=UNKNOWN plan=UNKNOWN
numbertype=redirect-called
00:51:56:regxrule_get_RegXrule:Invalid translation ruleset tag=0
00:51:56:regxrule_profile_match:Error:ruleset for redirect-called number not found
00:51:56:regxrule_profile_translate:No match:number= type=UNKNOWN plan=UNKNOWN
00:51:56:regxrule_profile_translate:number=5108880101 type=unknown plan=unknown
numbertype=called
00:51:56:regxrule_get_RegXrule:Invalid translation ruleset tag=0
00:51:56:regxrule_profile_match:Error:ruleset for called number not found
00:51:56:regxrule_profile_translate:No match:number=5108880101 type=unknown plan=unknown
00:51:56:regxrule_stack_push_RegXruleNumInfo:stack=0x63DECAF4; count=1
00:51:56:regxrule_dp_translate:No profile found in peer 5108888 for outgoing direction
00:51:56:regxrule_dp_translate:calling_number=5551212 calling_octet=0x0
        called_number=5108880101 called_octet=0x80
        redirect_number= redirect_type=4294967295 redirect_plan=4294967295
00:51:56:regxrule_stack_pop_RegXruleNumInfo:stack=0x63DECAF4; count=2
00:51:56:regxrule_stack_push_RegXruleNumInfo:stack=0x63DECAF4; count=1
```

Table 13 provides an alphabetical listing of the **debug voice translation** command fields and a description of each field.

Table 13 debug voice translation Field Descriptions

Field	Description
called_number	Called number (DNIS).
called_octet	Octect3 of called IE.
calling_number	Calling number (ANI).
calling_octect	Octect3 of calling IE.
count	Number of elements in the translation stack.
Input Plan	Numbering plan of the input.
Input Type	Numbering type of the input.
matchPattern	Regular exp used for matching.
Match Plan	Numbering plan in the translation rule.
Match Type	Numbering type in the translation rule.
number	Incoming number for translation.
numbertype	Type of number: calling, called, or redirect.
pattern	Input string to the regular expression for matching.
plan	Numbering plan.
redirect_number	Redirect number.
redirect_plan	Numbering plan in the redirect number.
redirect_type	Numbering type in the redirect number.
replaced pattern	Final string after applying replacement rule of translation rule.
replacePattern	Replacement pattern in the translation rule.

Table 13 debug voice translation Field Descriptions (continued)

Field	Description
Replace Plan	Replacement numbering plan in the translation rule.
Replace Type	Replacement numbering type in the translation rule.
stack	Value of the translation rule stack.
tag	Tag of the translation rule.
type	Numbering type in the translation rule.
xlt_number	Number after translation.
xlt_plan	Numbering plan after translation.
xlt_type	Numbering type after translation.

Related Commands

Command	Description
rule (voice translation-rule)	Defines the translation rule parameters for matching and replacing call number patterns.
show voice translation-rule	Displays a voice translation rule.
test voice translation-rule	Tests a voice translation rule.
voice translation-rule	Initiates the translation rule definition.

debug voip enum

The **debug voip enum** is identical in syntax, usage, and output to **debug voice enum**. Refer to the **debug voice enum** command description for detailed information.

description (trunk group)

To add a description to a trunk group, use the **description** command in trunk group configuration mode. To delete the description, use the **no** form of this command.

description *text*

no description *text*

Syntax Description

text	The maximum length of the trunk group description is 63 alphanumeric characters.

Defaults

No default behavior or values

Command Modes

Trunk group configuration

Command History

Release	Modification
12.2(2)XU	This command was introduced.

Examples

The following example shows a description for a trunk group:

```
Router(config)# trunk group alpha1
Router(config-trunk-group)# description carrierAgroup1
```

Related Commands

Command	Description
trunk group	Initiates the definition of a trunk group.

description (voice source group)

To add a description to a voice source group, use the **description** command in voice source-group configuration mode. To delete the description, use the **no** form of this command.

description *text*

no description *text*

Syntax Description

text	The maximum length of the voice source group description is 63 alphanumeric characters.

Defaults

No default behavior or values

Command Modes

Voice source group configuration

Command History

Release	Modification
12.2(2)XU	This command was introduced.

Examples

The following example shows a description for a voice source group:

```
Router(config)# voice source-group northern1
Router(cfg-source-grp)# description carrierBgroup3
```

Related Commands

Command	Description
voice source-group	Defines a source group for voice calls.

disconnect-cause

To specify a cause for calls being blocked, use the **disconnect-cause** command in voice source-group configuration mode. To return to the default value, use the **no** form of this command.

disconnect-cause {**call-reject** | **invalid-number** | **unassigned-number** | **user-busy**}

no disconnect-cause {**call-reject** | **invalid-number** | **unassigned-number** | **user-busy**}

Syntax Description

call-reject	Specifies call rejection as the reason for blocked calls.
invalid-number	Specifies invalid number as the reason for blocked calls.
unassigned-number	Specifies unassigned number as the reason for blocked calls.
user-busy	Specifies busy as the reason for blocked calls.

Defaults

Default message: No-service

Command Modes

Voice source-group configuration

Command History

Release	Modification
12.2(2)XU	This command was introduced.

Usage Guidelines

Use **disconnect-cause** to change the standard disconnect message “No service” to a more informative cause type. The system returns the disconnect message to the source gateway when an H.323 call is blocked because of access-list restrictions.

Note The disconnect message may not be relayed back to the originating gateway for SIP calls.

Examples

The following example returns a “user busy” message for a blocked call:

```
Router(config)# voice source-group southern3
Router(cfg-source-grp)# disconnect-cause user-busy
```

Related Commands

Command	Description
access-list	Specifies an access list for identifying the source of an incoming call.
voice source-group	Initiates a source IP group definition.

h323zone-id (voice source group)

To specify the zone identification for an incoming H.323 call, use the **h323zone-id** command in voice source-group configuration mode. To delete the zone ID, use the **no** form of this command.

h323zone-id *name*

no h323zone-id *name*

Syntax Description

name	The maximum size of the zone id name is 127 alphanumeric characters.

Defaults

No default behavior or values

Command Modes

Voice source-group configuration

CommandHistory

Release	Modification
12.2(2)XU	This command was introduced.

Usage Guidelines

Use the **h323zone-id** command to specify the zone to use for incoming H.323 calls in the voice source-group definition. The zone ID *name* matches the source zone ID of an incoming H.323 call.

Note The SIP protocol does not support zone ID functionality.

Examples

The following example associates the zone ID 5400-gw1 with incoming calls for source IP group northcal:

```
Router(config)# voice source-group northcal
Router(cfg-source-grp)# h323zone-id 5400-gw1
```

Related Commands

Command	Description
voice source-group	Defines a source group for voice calls.

hunt-scheme least-idle

To enable the least idle search method for finding an available channel in a trunk group for outgoing calls, use the **hunt-scheme least-idle** command in trunk group configuration mode. To delete the hunt scheme from the trunk group profile, use the **no** form of the command.

hunt-scheme least-idle [**both** | **even** | **odd**]

no hunt-scheme

Syntax Description

both	(Optional) Searches both even- and odd-numbered channels.
even	Searches for an idle even-numbered channel with the shortest idle time. If no idle even-numbered channels are available, an odd-numbered channel with the *longes*t idle time is sought.
odd	Searches for an idle odd-numbered channel with the shortest idle time. If no idle odd-numbered channels are available, an even-numbered channel with the *longest* idle time is sought.

Defaults

hunt scheme: least-used

channel number: both

Command Modes

Trunk group configuration

Command History

Release	Modification
12.2(2)XU	The **least-idle**, **longest-idle**, **random**, **sequential**, **both**, **even**, **odd**, **up**, and **down** parameters were added.

Usage Guidelines

Use the least idle hunt scheme in situations where you want to re-use the last selected channel.

The least idle hunt scheme looks for the channel that has just become available. The software looks at all the channels in the trunk group, regardless of member precedence, and selects the channel that has most recently come into the available queue.

If no channels are available at the time of the call request, the software returns a cause code determined by the application configured on the inbound dial peer.

If the **even** quantifier is set, the even-numbered channel that is most recently available is selected. Similarly, if the **odd** quantifier is set, the odd-numbered channel with the shortest idle time is selected. If **both** is set, the most recently available channel, regardless of channel number, is selected.

Examples

The following example searches for an even-numbered idle channel with the shortest idle time within a trunk group:

```
Router(config)# trunk group northwestsales
Router(config-trunk-group)# hunt-scheme least-idle even
```

Related Commands

Command	Description
trunk group	Initiates a trunk group profile.
hunt-scheme longest-idle	Enables the longest-idle hunt scheme.

hunt-scheme least-used

To enable the least used search method for finding an available channel in a trunk group for outgoing calls, use the **hunt-scheme least-used** command in trunk group configuration mode. To delete the hunt scheme from the trunk group profile, use the **no** form of the command.

hunt-scheme least-used [**both** | **even** | **odd** [**up** | **down**]]

no hunt-scheme

Syntax Description

both	Searches both even- and odd-numbered channels.
even	Searches for an idle even-numbered channel. If no idle even-numbered channels are available, an odd-numbered channel is sought.
odd	Searches for an idle odd-numbered channel. If no idle odd-numbered channels are available, an even-numbered channel is sought.
up	Searches channels in ascending order based within a trunk group member. Used with **even**, **odd**, **both**.
down	Searches channels in descending order within a trunk group member. Used with **even**, **odd**, **both**.

Defaults

hunt scheme: least-used

channel number: both

direction: up

Command Modes

Trunk group configuration

Command History

Release	Modification
12.2(2)XU	The **least-idle**, **longest-idle**, **random**, **sequential**, **both**, **even**, **odd**, **up**, and **down** parameters were added.

Usage Guidelines

The least-used search method selects an idle channel from a trunk group member that has the highest number of available channels at the time the hunt request was initiated. The high number of unused channels indicates that the trunk group member has not been very active compared with other trunk group members.

After selecting the trunk group member, the software searches the channels by direction and then by channel number:

- If **even up** is set, the software searches the trunk group members in ascending order of preference to determine which member has the highest number of available even-numbered channels. If no available even-numbered channel is found, the software searches the members again in ascending order for the member that has the highest number of available odd-numbered channels.

- If **odd up** is set, the software searches the trunk group members in ascending order of preference to determine which member has the highest number of available odd-numbered channels. If no available odd-numbered channel is found, the software searches the members again in ascending order for the member that has the highest number of available even-numbered channels.
- If **even down** is set, the software searches in descending order of preference to determine which member has the highest number of available even-numbered channels. If no available even-numbered channel is found, the software searches the members again in descending order for the member that has the highest number of available odd-numbered channels.
- If **odd down** is set, the software searches in descending order of preference to determine which member has the highest number of available odd-numbered channels. If no available odd-numbered channel is found, the software searches the members again in descending order for the member that has the highest number of available even-numbered channels.

If no channels are available in any of the trunk group members, the software returns the standard "no service" message.

Examples

The following example searches in ascending order for an even-numbered idle channel in a trunk group member with the highest number of available channels:

```
Router(config)# trunk group northwestsales
Router(config-trunk-group)# hunt-scheme least-used even up
```

Related Commands

Command	Description
trunk group	Initiates a trunk group profile.

hunt-scheme longest-idle

To enable the longest idle search method for finding an available channel in a trunk group for outgoing calls, use the **hunt-scheme longest-idle** command in trunk group configuration mode. To delete the hunt scheme from the trunk group profile, use the **no** form of the command.

hunt-scheme longest-idle [**both** | **even** | **odd**]

no hunt-scheme

Syntax Description

both	Searches both even- and odd-numbered channels.
even	Searches for an idle even-numbered channel with the longest idle time. If no idle even-numbered channels are available, an odd-numbered channel with the *shortest* idle time is sought.
odd	Searches for an idle odd-numbered channel with the longest idle time. If no idle odd-numbered channels are available, an even-numbered channel with the *shortest* idle time is sought.

Defaults

hunt scheme: least-used

channel number: both

Command Modes

Trunk group configuration

Command History

Release	Modification
12.2(2)XU	The **least-idle**, **longest-idle**, **random**, **sequential**, **both**, **even**, **odd**, **up**, and **down** parameters were added.

Usage Guidelines

The longest idle hunt schemes attempts to route a call using a channel from the trunk group member that has been idled the longest time.

If the **even** qualifier is set, the search looks for an even-numbered idle channel from the trunk group member that has been idle the longest. If no even-numbered idle channel is found, the search looks for an odd-numbered idle channel from the trunk group member with the *shortest* idle time.

Similarly, if the **odd** qualifier is set, the search begins looking for an odd-numbered channel from the trunk group member that has been idle the longest. If no odd-numbered idle channel is found, the search looks for an even-numbered idle channel from the trunk group member with the *shortest* idle time.

If the **both** qualifier is set, the search looks for any (odd or even) idle channel in the trunk group member that has been idle the longest.

If no channels are available in any of the trunk group members, the software returns the standard “no service” message.

Examples

The following example searches in ascending order for an even-numbered idle channel in the trunk group member with the largest idle time:

```
Router(config)# trunk group northwestsales
Router(config-trunk-group)# hunt-scheme longest-idle even
```

Related Commands

Command	Description
trunk group	Initiates a trunk group profile.
hunt-scheme least-idle	Enables the least-idle hunt scheme.

hunt-scheme random

To enable the random search method for finding an available channel in a trunk group for outgoing calls, use the **hunt-scheme random** command in trunk group configuration mode. To delete the hunt scheme from the trunk group profile, use the **no** form of the command.

hunt-scheme random

no hunt-scheme

Syntax Description

This command has no arguments or keywords.

Defaults

hunt scheme: least-used

Command Modes

Trunk group configuration

Command History

Release	Modification
12.2(2)XU	The **least-idle**, **longest-idle**, **random**, **sequential**, **both**, **even**, **odd**, **up**, and **down** parameters were added.

Usage Guidelines

The random search method selects trunk group member at random for an idle channel. After the trunk group member is selected, a channel is chosen at random. If that channel is not available, another trunk group member is chosen at random and one of its channels is randomly chosen.

If no channels are available, the software returns the standard “no service” message.

Examples

The following example searches trunk group members in random order for an idle channel:

```
Router(config)# trunk group northwestsales
Router(config-trunk-group)# hunt-scheme random
```

Related Commands

Command	Description
trunk group	Initiates a trunk group profile.

hunt-scheme round-robin

To enable the round robin search method for finding an available channel in a trunk group for outgoing calls, use the **hunt-scheme** command in trunk group configuration mode. To delete the hunt scheme from the trunk group profile, use the **no** form of the command.

hunt-scheme round-robin [**both** | **even** | **odd** [**up** | **down**]]

no hunt-scheme

Syntax Description

both	Searches for an idle channel from both even- and odd-numbered channels at the same precedence.
even	Searches for an idle even-numbered channel. If no idle even-numbered channels are available, an odd-numbered channel is used.
odd	Searches for an idle odd-numbered channel. If no idle odd-numbered channels are available, an even-numbered channel is used.
up	Searches channels in ascending order based within a trunk group member. Used with **even**, **odd**, **both**.
down	Searches channels in descending order within a trunk group member. Used with **even**, **odd**, **both**.

Defaults

hunt scheme: least-used

channel number: both

Command Modes

Trunk group configuration

Command History

Release	Modification
12.2(2)XU	The **least-idle**, **longest-idle**, **random**, **sequential**, **both**, **even**, **odd**, **up**, and **down** parameters were added.

Usage Guidelines

The round-robin hunt scheme searches trunk group members one after the other for an idle channel. The history of the last used trunk group member is saved to identify the next trunk group member to use for a new idle channel request. This method tries to balance the load of channel use across trunk group members.

For example, suppose a trunk group has three trunk group members: A, B, and C. Trunk group member A has the highest preference, B has the next highest, and C has the lowest. The software starts the search with A:

- if A has an idle channel, that channel is used and the next request for an idle channel starts with B.
- if A does not have an idle channel, the search moves to B:
  - if B has an idle channel, that channel is used and the next request for an idle channel starts with C.

- if B does not have an idle channel, the search moves to C:
  - * if C has an idle channel, that channel is used and the next request for an idle channel starts with A.
  - * if C does not have an idle channel, the search returns to A.

  If none of the trunk group members have an idle channel available for the current channel request, the software returns the standard “no service” message.

Compare this hunt scheme with **hunt-scheme sequential**, where the next request for an idle channel always starts with the first trunk group member of the trunk group, regardless of where the last idle channel was found.

If the **even** qualifier is set, the search looks for an even-numbered idle channel starting with the trunk group member with the highest preference. If no even-numbered idle channel is found, the search looks for an even-numbered idle channel in the next trunk group member. If no even-numbered idle channel is found in any trunk group member, the search repeats the process for an odd-numbered channel.

Similarly, if the **odd** qualifier is set, the search begins looking for an odd-numbered channel, and if none is found in any of the trunk group members, the search repeats the process for an even-numbered channel.

If the **both** qualifier is set, the search looks for any idle channel in the trunk group member.

Examples

The following example searches for an even-numbered idle channel starting with the trunk group member next in order after the previously used member:

```
Router(config)# trunk group northwestregion
Router(config-trunk-group)# hunt-scheme round-robin even
```

Related Commands

Command	Description
trunk group	Initiates a trunk group profile definition.
hunt-scheme sequential	Enables a sequential idle channel hunt scheme.

hunt-scheme sequential

To specify the sequential search method for finding an available channel in a trunk group for outgoing calls, use the **hunt-scheme sequential** command in trunk group profile configuration mode. To delete the hunt scheme from the trunk group profile, use the **no** form of the command.

hunt-scheme sequential [**both** | **even** | **odd** [**up** | **down**]]

no hunt-scheme

Syntax Description

both	Searches both even- and odd-numbered channels.
even	Searches for an idle even-numbered channel. If no idle even-numbered channels are available, an odd-numbered channel is sought.
odd	Searches for an idle odd-numbered channel. If no idle odd-numbered channels are available, an even-numbered channel is sought.
up	Searches channels in ascending order based within a trunk group member. Used with **even**, **odd**, **both**.
down	Searches channels in descending order within a trunk group member. Used with **even**, **odd**, **both**.

Defaults

hunt scheme: least-used

channel number: both

direction: up

Command Modes

Trunk group configuration

Command History

Release	Modification
12.2(2)XU	The **least-idle**, **longest-idle**, **random**, **sequential**, **both**, **even**, **odd**, **up**, and **down** parameters were added.

Usage Guidelines

The sequential hunt scheme selects an idle channel, starting with the trunk group member with the highest preference within the trunk group. Regardless of where the last idle channel was found, an idle channel request starts searching with this highest-preference trunk group member.

For example, suppose a trunk group has three trunk group members: A, B, and C. Trunk group member A has the highest preference, B has the next highest, and C has the lowest. The software starts the search with trunk group A:

- if A has an idle channel, that channel is used and the next request for an idle channel starts with A.
- if A does not have an idle channel, the search moves to B:
  - if B has an idle channel, that channel is used and the next request for an idle channel starts with A.
  - if B does not have an idle channel, the search moves to C:

*) if C has an idle channel, that channel is used and the next request for an idle channel starts with A.

*) if C does not have an idle channel, the software returns the standard “no service” message.

Compare this hunt scheme with **hunt-scheme round-robin**, where the next request for an idle channel starts with the next un-used trunk group member of the trunk group.

If the **even** qualifier is set, the search looks for an even-numbered idle channel starting with the trunk group member with the highest preference. If no even-numbered idle channel is found, the search looks for an even-numbered idle channel in the next trunk group member. If no even-numbered idle channel is found, the search repeats the process for an odd-numbered idle channel.

Similarly, if the **odd** qualifier is set, the search begins looking for an odd-numbered channel, starting with the trunk group member with the highest preference. If none is found in any of the trunk group members, the search repeats the process for an even-numbered channel.

If the **both** qualifier is set, the search looks for any idle channel in the trunk group member.

Use the sequential hunt scheme in situations that benefit from a predictable channel allocation. In addition, if one end of the routing path is defined with **sequential even up** and the other end with **sequential odd up**, glare conditions are avoided.

Examples

The following example searches in ascending order for an even-numbered idle channel starting with the trunk group member of highest precedence:

```
Router(config)# trunk group northwestsales
Router(config-trunk-group)# hunt-scheme sequential even up
```

Related Commands

Command	Description
hunt-scheme round-robin	Enables a round-robin hunt scheme.
trunk group	Initiates a trunk group profile definition.

max-calls

To set the maximum number of calls that a trunk group can handle, use the **max-calls** command in trunk group configuration mode. To return to the defaults, use the **no** form of this command.

max-calls {**any** | **data** | **voice**} *number* [**direction in** | **out**]

no max-calls {**any** | **data** | **voice**} *number* [**direction in** | **out**]

Syntax Description

any	Assigns the maximum number of calls that the trunk group can handle, regardless of the type of call.
data	Assigns the maximum number of data calls to the trunk group.
voice	Assigns the maximum number of voice calls to the trunk group.
number	Valid values are 0 through 1000.
direction	Specifies direction of calls.
in	Allows only incoming calls.
out	Allows only outgoing calls.

Defaults

No limit

Command Modes

Trunk group configuration

Command History

Release	Modification
12.2(2)XU	This command was introduced.

Usage Guidelines

Use the **max-calls** command to set the threshold of calls handled by the trunk group.

If the maximum is reached, the trunk group becomes unavailable for more calls. After the number calls falls below the maximum, the trunk group accepts more calls.

Examples

The following example assigns a maximum number of 500 calls of any type to trunk group gw15:

```
Router(config)# trunk group gw15
Router(config-trunk-group)# max-calls any 500
```

The following example assigns a maximum of 200 data calls and 750 voice calls to trunk group 32:

```
Router(config)# trunk group 32
Router(config-trunk-group)# max-calls data 200
Router(config-trunk-group)# max-calls voice 750
```

Related Commands

Command	Description
trunk group	Initiates a trunk group definition.
show trunk group	Displays the configuration of one or more trunk groups.

rule (ENUM configuration)

To define a rule for an ENUM match table, use the **rule** command in ENUM configuration mode. To delete the rule, use the no form of this command.

rule *rule-number preference* {*/match-pattern/ /replacement-rule/ domain-name*}

no rule *rule-number preference* {*/match-pattern/ /replacement-rule/ domain-name*}

Syntax Description

rule-number	Assigns an identification number to the rule. Valid values are 1 through 2147483647.
preference	Assigns a preference value to the rule. Valid values are 1 through 2147483647. The lower value has a higher preference.
/match-pattern/	The system looks for this stream editor (SED) expression within the call information. The slash "/" is a delimiter in the pattern.
/replacement-rule/	The system replaces *match-pattern* with this SED expression in the call information. The slash "/" is a delimiter in the pattern.
domain-name	The domain name to be used while sending the query to the DNS server.

Defaults

No default behavior or values.

Command Modes

ENUM configuration

Command History

Release	Modification
12.2(2)XU	This command was introduced.

Usage Guidelines

The following table shows examples of match patterns, input strings, and result strings.

Match Pattern	Replacement Pattern	Input String	Result String	Description
`/^$/`	`//`			Null string to null string.
`/^.*/`	`//`	`4085662711`		Any string to null string.
`/^456\(.*\)/`	`/853\1/`	`4567123`	`8537123`	Match from the beginning of the input string.
`/\(^...\)456\(...\)/`	`/\1853\2/`	`408456777`	`4088537777`	Match string from the middle of the input string.
`/\(.*\)8920/`	`/\15555/`	`4088538920`	`4088535555`	Match from the end of the input string.
`/^1#\(.*\)/`	`/\1/`	`1#2345`	`2345`	Replace match string with null string.
`/^408...\(8333\)/`	`/853\1/`	`4087778333`	`8538333`	Match multiple patterns.

Rules are entered in any order, but their preference number determines the sequence in which they are used for matching against the input string, which is called number. A lower preference number is used before a higher preference number.

If a match is found, the input string is modified according to the replacement rule, and the E.164 domain name is attached to the modified number. This longer number is sent to a domain name system (DNS) server to determine a destination for the call. The server returns one or more URLs as possible destinations. The originating gateway tries to place the call using each URL in order of preference. If call cannot be completed using any of the URLs, the call is disconnected.

Examples

The following example defines an ENUM rule number 3 with preference 2. The beginning of the call string is checked for digits 9011; when a match is found, the 9011 is replaced with 1408 and the call is sent out as an e164.arpa number.

```
Router(config)# voice enum-match-table number
Router(config-enum)# rule 3 2 /^9011\(.*\)//+1408\1/arpa
```

Related Commands

Command	Description
voice enum-match-table	Initiates the definition of a voice ENUM match table.
show voice enum-match-table	Displays the configuration of a voice ENUM match table.
test enum	Tests the ENUM rule.

rule (voice translation-rule)

To define a translation rule, use the **rule** command in voice translation-rule configuration mode. To delete the translation rule, use the **no** form of this command.

Match and Replace Rule

rule *precedence /match-pattern/ /replace-pattern/*
[**type** {*match-type replace-type*} **plan** {*match-type replace-type*}] |
[**plan** {*match-type replace-type*}]

no rule *precedence*

Reject Rule

rule *precedence* **reject** */match-pattern/* [**type** *match-type* **plan** *match-type*] | [**plan** *match-type*]

no rule *precedence*

Syntax Description

precedence	The priority of the translation rule. Valid values are 1 through 15.
/match-pattern/	The system looks for this SED expression within the call information.The slash '/' is a delimiter in the pattern.
/replace-pattern/	The system replaces the *match-pattern* with this SED expression. The slash '/' is a delimiter in the pattern.

type {*match-type replace-type*}	Valid values for **type** *match-type* are: • abbreviated—Abbreviated representation of the complete number as supported by this network. • any—Any type of called number. • international—Number called to reach a subscriber in another country. • national—Number called to reach a subscriber in the same country, but outside the local network. • network—Administrative or service number specific to the serving network. • reserved—Reserved for extension. • subscriber—Number called to reach a subscriber in the same local network. • unknown—Type of number is unknown by the network. Valid values for **type** *replace-type* are: • abbreviated—Abbreviated representation of the complete number as supported by this network. • international—Number called to reach a subscriber in another country. • national—Number called to reach a subscriber in the same country, but outside the local network. • network—Administrative or service number specific to the serving network. • reserved—Reserved for extension. • subscriber—Number called to reach a subscriber in the same local network. • unknown—Type of number is unknown by the network.

plan {*match-type replace-type*}	Valid values for **plan** *match-type* are: • any—Any type of dialed number • data • ermes • isdn • national—Number called to reach a subscriber in the same country, but outside the local network. • private • reserved—Reserved for extension. • telex • unknown—Type of number is unknown by the network. Valid values for **plan** *replace-type* are: • data • ermes • isdn • national—Number called to reach a subscriber in the same country, but outside the local network. • private • reserved—Reserved for extension. • telex • unknown—Type of number is unknown by the network.
reject	Indicates the match pattern of a translation rule is used for call reject purposes.

Defaults

No default behavior or values.

Command Modes

Voice translation-rule configuration

Command History

Release	Modification
12.2(2)XU	This command was introduced with a new format to the voice translation rule configuration mode.

Usage Guidelines

Note The **rule** command introduced in this feature is a subcommand of the **voice translation-rule** command. An earlier version of this command uses the same name but is a subcommand of the **translation-rule** command and has a slightly different command syntax. Going forward, Cisco recommends that you use this newer version to define rules for call matching. Eventually, the **translation-rule** command will not be supported.

A translation rule applies to a calling party number (Automatic Number Identification [ANI]) or a called party number (Dial Number Information Service [DNIS]) for both incoming, outgoing, and redirected calls within Cisco H.323 voice-enabled gateways.

Number translation occurs several times during the call routing process. In both the originating and terminating gateways, the incoming call is translated before matching an inbound dial peer, before matching an outbound dial peer, and before setting up a call request. Your dial plan should account for these translation steps when defining the translation rules.

Each rule consists of stream editor (SED)-like expressions for the matching and replacement patterns, and may include any of the following components:

- escape sequences using backslashes
- keywords “NULL” and “ANY”
- a CTRL-v before entering a “?” in order to use the “?” as a symbol in a match pattern

The following table shows examples of match patterns, input strings, and result strings.

Match Pattern	Replacement Pattern	Input String	Result String	Description
/^$/	//			Null string to null string.
/^.*/	//	4085662711		Any string to null string.
/^456\(.*\)/	/853\1/	4567123	8537123	Match from the beginning of the input string.
/\(^...\)456\(...\)/	/\1853\2/	4084567777	4088537777	Match string from the middle of the input string.
/\(.*\)8920/	/\15555/	4088538920	4088535555	Match from the end of the input string.
/^1#\(.*\)/	/\1/	1#2345	2345	Replace match string with null string.
/^408...\(8333\)/	/853\1/	4087778333	8538333	Match multiple patterns.

Several rules may be grouped together into a translation rule, which gives a name to the rule set. A translation rule may contain up to 15 rules. All calls referencing this translation rule are translated against this set of criteria.

Rules may be used in a different order than how they were typed into the set. Each rule’s *precedence* value specifies the priority order in which the rules are to be used. For example, rule 3 may be entered before rule 1, but the software uses rule 1 before rule 3.

The software supports up to 128 translation rules. A translation profile collects and identifies a set of these translation rules for translating called, calling, and redirected numbers. A translation profile is referenced by trunk groups, source IP groups, voice ports, dial peers, and interfaces for handling call translation.

Examples

The following example applies a translation rule. If a called number starts with 5552205 or 72205, then translation rule 21 will use the rule command to forward the number to 14085552205 instead.

```
Router(config)# voice translation-rule 21
Router(cfg-translation-rule)# rule 1 /^5552205/ /14085552205/
Router(cfg-translation-rule)# rule 2 /^72205/ /14085552205/
```

In the next example, if a called number is either 14085552205 or 014085552205, then after the execution of the translation rule 345, the forwarding digits are 52205. If the match type is configured and the type is not "unknown," then the dial peer matching is required to match the input string numbering type.

```
Router(config)# voice translation-rule 345
Router(cfg-translation-rule)# rule 1 /^14085552205/ /52205/ plan any national
Router(cfg-translation-rule)# rule 2 /^014085552205/ /52205/ plan any national
```

Related Commands

Command	Description
voice translation-rule	Initiates the voice translation-rule definition.
show voice translation-rule	Displays the parameters of a translation rule.

session target

To specify an ENUM search table for the target session, use the **session target** command in dial-peer configuration mode. To delete the session target, use the **no** form of this command.

session target enum: *table-num*

no session target enum: *table-num*

Syntax Description

enum: *table-num*	Specifies the number of an ENUM search table. Valid values are 1 through 15.

Defaults

No default behavior or values

Command Modes

Dial-peer configuration

Command History

Release	Modification
12.2(2)XU	This command was introduced.

Usage Guidelines

Examples

The following example indicates that calls made using dial peer 100 should use the preferential order of rules in enum match table 3.

```
Router(config)# dial-peer voice 101 voip
Router(config-dial-peer)# session target enum: 3
```

Related Commands

Command	Description
dial-peer voice	Defines a dial peer for voice calls.

show crm

To display the carrier call capacities statistics, use the **show crm** command in privileged EXEC mode.

show crm

Syntax Description

This command has no keywords or arguments.

Defaults

No default behavior or values

Command Modes

EXEC

Command History

Release	Modification
12.2(2)XU	This command was introduced.

Examples

The following example illustrates the carrier call capacities statistics:

```
Router# show crm
Carrier:1411
    Max calls:4
    Max Voice (in) :      4    Cur Voice (in) :      0
    Max Voice (out):      4    Cur Voice (out):      0
    Max Data (in)  :      4    Cur Data (in)  :      0
    Max Data (out) :      4    Cur Data (out) :      0

Trunk Group Label: 100
    Max calls:6
    Max Voice (in) :      6    Cur Voice (in) :      0
    Max Voice (out):      6    Cur Voice (out):      0
    Max Data (in)  :      6    Cur Data (in)  :      0
    Max Data (out) :      6    Cur Data (out) :      0
```

Table 14 provides an alphabetical listing of the **show crm** fields and a description of each field.

Table 14 show crm Field Descriptions

Field	Description
Carrier	The ID of the carrier handling the calls.
Cur Data (in)	Current number of incoming data calls handled by the carrier or trunk group.
Cur Data (out)	Current number of outgoing data calls handled by the carrier or trunk group.
Cur Voice (in)	Current number of incoming voice calls handled by the carrier or trunk group.

Table 14 show crm Field Descriptions

Field	Description
Cur Voice (out)	Current number of outgoing voice calls handled by the carrier or trunk group.
Max calls	Maximum number of calls handled by the carrier or trunk group.
Max Voice (in)	Maximum number of incoming voice calls handled by the carrier or trunk group.
Max Voice (out)	Maximum number of outgoing voice calls handled by the carrier or trunk group.
Max Data (in)	Maximum number of incoming data calls handled by the carrier or trunk group.
Max Data (out)	Maximum number of outgoing data calls handled by the carrier or trunk group.
Trunk Group label	The label of the trunk group handling the calls.

Related Commands

Command	Description
carrier-id (dial-peer)	Specifies the carrier associated with VoIP calls.
max-calls	Specifies the maximum number of calls handled by a trunk group.
trunk-group-label (dial-peer)	Specifies the trunk group associated with VoIP calls.

show dial-peer voice

To display configuration information for dial peers, use the **show dial-peer voice** command in privileged EXEC mode.

show dial-peer voice [*number* | summary]

Syntax Description

number	(Optional) Tag number of a specific dial peer. This option displays configuration information for a single dial peer identified by the *number* argument. Valid entries are 1 to 32767.
summary	(Optional) Displays a summary of all configured dial peers.

Defaults

No default behavior of values.

Command Modes

Privileged EXEC

Command History

Release	Modification
11.3(1)T	This command was introduced.
11.3(1)MA	The summary keyword was added for the Cisco MC3810 multiservice concentrator.
12.0(3)XG	This command was modified to support VoFR for the Cisco 2600 series and Cisco 3600 series routers.
12.0(4)T	Support was added for VoFR for the Cisco 7200 series router.
12.1(3)T	This command was modified for modem passthrough over Voice over IP on the Cisco AS5300.
12.2(2)XB	This command was modified to support Voice XML applications.
12.2(2)XU	This command was modified to support Cisco AS5350, Cisco AS5400, Cisco AS5800, and Cisco AS5850 platforms. The output was modified to display carrier, trunk group label, and translation-profile information.

Usage Guidelines

Use the **show dial-peer voice** privileged EXEC command to display the configuration for all dial peers configured for the router. To show configuration information for only one specific dial peer, use the argument *number* to identify the dial peer.

Examples

The following is sample output from the **show dial-peer voice summary** command:

```
Router# show dial-peer voice summary
dial-peer hunt 0
                AD                                      PRE PASS
TAG    TYPE  MIN  OPER PREFIX    DEST-PATTERN      FER THRU SESS-TARGET   PORT
111    pots  up   up                               0
222    pots  up   down           4158888           0
```

```
23388- pots  up   up                                0
88
650    voip  up   up             650.......       0  syst ipv4:1.8.50.14
1002   pots  up   down                              0                      1:3
```

Table 15 provides an alphabetical list of the **show dial-peer voice** fields and a description of each field.

Table 15 show dial-peer voice summary Field Description

Field	Description
ADMIN	Whether the Administrative state is up or down.
DEST-PATTERN	Destination pattern that is configured in the dial peer by using the **destination-pattern** command.
dial-peer hunt	Hunt group selection order that is defined for the dial peer by using the **dial-peer hunt** command.
OPER	Whether the operational state is up or down.
PASS THRU	Modem passthrough method that is configured in the dial peer by using the **modem passthrough** command.
PREF	Hunt group preference that is configured in the dial peer by using the **preference** command.
PREFIX	Prefix that is configured in the dial peer by using the **prefix** command.
PORT	Router voice port that is configured for the dial peer. Valid only for POTS dial peers.
SESS-TARGET	Destination that is configured in the dial peer by using the **session target** command.
TAG	Unique identifier assigned to the dial peer when it was created.
TYPE	Type of dial peer; POTS, VoIP, VoFR, VoATM, or MMoIP.

The following is sample output from the **show dial-peer voice** command for a VoIP dial peer:

```
Router# show dial-peer voice 222
VoiceEncapPeer222
        information type = voice,
        description = `',
        tag = 222, destination-pattern = `4158888',
        answer-address = `', preference=0,
        CLID Restriction = None
        CLID Network Number = `'
        CLID Second Number sent
        source carrier-id = `', target carrier-id = `',
        source trunk-group-label = `',  target trunk-group-label = `',
        numbering Type = `unknown'
        group = 222, Admin state is up, Operation state is up,
        incoming called-number = `', connections/maximum = 0/unlimited,
        DTMF Relay = disabled,
        huntstop = disabled,
        in bound application associated: 'DEFAULT'
        out bound application associated: ''
```

```
        dnis-map =
        permission :both
        incoming COR list:maximum capability
        outgoing COR list:minimum requirement
        Translation profile (Incoming):
        Translation profile (Outgoing):
        incoming call blocking:
        translation-profile = `'
        disconnect-cause = `no-service'
        trunk-group:
        id = `1', preference = `'
        type = pots, prefix = `',
        forward-digits default
        session-target = `', up,
        direct-inward-dial = disabled,
        digit_strip = disabled,
        register E.164 number with GK = TRUE
        fax rate = system,   payload size =  20 bytes

Time elapsed since last clearing of voice call statistics never
        Connect Time = 0, Charged Units = 0,
        Successful Calls = 0, Failed Calls = 12, Incomplete Calls = 0
        Accepted Calls = 0, Refused Calls = 0,
        Last Disconnect Cause is "2C  ",
        Last Disconnect Text is "no requested circuit (44)",
        Last Setup Time = 480467.
```

Table 16 provides an alphabetical listing of the **show dial-peer voice** output fields and a description of each field.

Table 16 show dial-peer voice Field Descriptions

Field	Description
Accepted Calls	Number of calls accepted from this peer system startup.
acc-qos	Lowest acceptable quality of service configured for calls for this peer.
Admin state	Administrative state of this peer.
answer-address	Answer address configured for this dial peer.
Charged Units	Total number of charging units applying to this peer since system startup. The unit of measure for this field in hundredths of a second.
CLID Restriction	The Calling line ID (CLID) masking feature restricts the pre-sentation—that is, masks the display—of a caller's phone number on a CICM application.
CLID Network Number	
CLID Second Number sent	If the attempt to call the first number fails, the second number will be used to connect to the next-hop address.
codec	Default voice codec rate of speech for this peer.
Connect Time	Accumulated connect time to the peer since system startup. The unit of measure for this field in hundredths of a second.
description	Shows the description of the voice source group if it has been set using the **description** command.

Table 16 show dial-peer voice Field Descriptions (continued)

Field	Description
dest-pat	Destination pattern (telephone number) for this peer.
digit-strip	When a called number is received and matched to a POTS dial peer, the matched digits are stripped and the remaining digits are forwarded to the voice interface. The digit-strip option is supported on POTS dial peers only.
direct-inward-dial	Shows whether or not direct inward dial number is enabled.
disconnect-cause	Indicates the disconnect cause for blocked calls. "No service" is the default cause. The **disconnect-cause** command specifies these cause values: • call-reject • invalid-number • unassigned number • user-busy
dnis-map	The name of the DNIS map that is configured in the dial peer, if any.
DTMF Relay	Indicates whether or not dual-tone multifrequency (DTMF) relay has been enabled, by using the **dtmf-relay** command, for this dial peer.
Expect factor	User-requested Expectation Factor of voice quality for calls through this peer.
fax rate	Fax transmission rate configured for this peer.
Failed Calls	Number of failed call attempts to this peer since system startup.
forward-digits default	Shows whether or not forward-digits default is configured.
group	Group number associated with this peer.
huntstop	Indicates whether dial-peer hunting has been turned on, by using the **huntstop** command, for this dial peer.
Icpif	Configured Calculated Planning Impairment Factor (ICPIF) value for calls sent by a dial peer.
in bound application associated	The IVR application that is configured to handle inbound calls to this dial peer.
incall-number	Full E.164 telephone number to be used to identify the dial peer.
incoming call blocking	Indicates whether incoming call blocking has been enabled.
incoming called-number	Indicates the incoming called number if it has been set by using the **incoming called-number** command.
incoming COR list	Shows dial peer's incoming class of restriction (COR) list. COR is used to specify which incoming dial peer can use which outgoing dial peer to make a call.
information type	Information type for this call; for example, voice or fax.

Table 16 show dial-peer voice Field Descriptions (continued)

Field	Description
Last Disconnect Cause	Encoded network cause associated with the last call. This value will be updated whenever a call is started or cleared and depends on the interface type and session protocol being used on this interface.
Last Disconnect Text	ASCII text describing the reason for the last call termination.
Last Setup Time	Value of the system up time when the last call to this peer was started.
Modem passthrough	Modem passthrough signaling method is named signaling event (NSE).
numbering Type	Indicates which numbering type has been configured. Options are: • Abbreviated—Abbreviated representation of the complete number as supported by this network • International—Number called to reach a subscriber in another country • National—Number called to reach a subscriber in the same country, but outside the local network • Network—Administrative or service number specific to the serving network • Reserved—Reserved for extension • Subscriber—Number called to reach a subscriber in the same local network • Unknown—Type of number is unknown by the network
Operation state	Operation state of this peer.
outbound application associated	The IVR application that is configured to handle outbound calls from this dial peer. Outbound calls are handed off to the named application.
outgoing COR list	Shows dial peer's outgoing class of restriction (COR) list. COR is used to specify which incoming dial peer can use which outgoing dial peer to make a call.
Payload type	NSE payload type.
Permission	Configured permission level for this peer.
Poor QOV Trap	Whether poor quality of voice trap messages have been enabled or disabled.
Redundancy	Packet redundancy (RFC 2198) for modem traffic.
Refused Calls	Number of calls from this peer refused since system startup.
register E.164 number with GK	Indicates whether or not the E.164 number is registered with the gatekeeper.
req-qos	Configured requested quality of service for calls for this dial peer.
session-target	Session target for this peer.

Table 16 show dial-peer voice Field Descriptions (continued)

Field	Description
sess-proto	Session protocol to be used for Internet calls between local and remote routers through the IP backbone.
source carrier-id	ID of the carrier handling the source call.
source trunk-group-label	Label of the trunk group handling the source call.
Successful Calls	Number of completed calls to this peer.
tag	Unique dial peer ID number.
Time elapsed since last clearing of voice call statistics	Time elapsed since last clearing of voice call statistics, shown as DDD:HH:MM:SS where DDD is the number of days, HH is hours, MM is minutes and SS is seconds, or never.
Translation profile (Incoming)	Shows the translation profile, if any, of the incoming calls.
Translation profile (Outgoing)	Shows the translation profile, if any, of the outgoing calls.
Translation-profile	Indicates the translation profile if it has been set using the **voice translation-profile** command.
type	Indicates the type of call, such as POTS or VoIP.
VAD	Whether voice activation detection (VAD) is enabled for this dial peer.

Related Commands

Command	Description
show dialplan incall number	Displays which POTS dial peer is matched for a specific calling number or voice port.
show dialplan number	Displays which dial peer is reached when a specific telephone number is dialed.
show num-exp	Displays how the number expansions are configured in Voice over IP.
show voice port	Displays configuration information about a specific voice port.

show trunk group

To display one or more trunk groups, use the **show trunk group** command in privileged EXEC mode.

show trunk group [*name* | **sort** [**ascending** | **descending**]]

Syntax Description

name	Identifies the trunk group to display.
sort	(Optional) Sorts the output by trunk group number.
ascending	(Optional) Specifies ascending display order of the trunk groups.
descending	(Optional) Specifies descending display order of the trunk groups.

Defaults

ascending order

Command Modes

Privileged EXEC

Command History

Release	Modification
12.2(2)XU	This command was introduced.

Usage Guidelines

Use the **sort** parameter to display all the trunks groups in either ascending or descending order.

Use the *name* parameter to display the information for a specific trunk group.

Examples

The following example displays the information for all trunk groups in descending order:

```
Router# show trunk group sort descending
```

The following example displays information for trunk group number 5:

```
Router# show trunk group 5
Trunk group:5
        Description:carrierB-east
        Carrier ID:1411

        Translation profile (Incoming):
        Translation profile (Outgoing):

        Hunt Scheme is least-used
        Max Calls (Incoming):  NOT-SET (Any)   1000 (Voice)    NOT-SET (Data)
        Max Calls (Outgoing):  NOT-SET (Any)   1000 (Voice)    NOT-SET (Data)
        Retries:0

        Trunk 7/3:1     Preference DEFAULT
                Total channels available :4
                Data = 0, Voice = 0, Pending = 0, Free = 4

        Total calls for trunk group:Data = 0, Voice = 0, Pend = 0, Free = 4
```

Table 17 provides an alphabetical list of the show trunk group output fields and a description of each field.

Table 17 show trunk group Field Descriptions

Field	Description
Carrier ID	Specifies the ID of the carrier assigned to the trunk group.
Data	Number of currently used data channels on the trunk or total data calls used by the trunk group.
Description	Description of the trunk group if entered with the **description (trunk group)** command.
Free	Number of currently available channels on the trunk or total available calls for the trunk group.
Hunt Scheme	Name of idle channel hunt scheme used for this trunk group.
Max calls (Incoming)	Maximum number of incoming calls handled by this trunk group.
Max calls (Outgoing)	Maximum number of outgoing calls handled by this trunk group.
Pending	Number of pending channels.
Preference	Preference of the trunk in the trunk group. If DEFAULT appears, then the trunk does not have a defined preference.
Retries	Number of times the gateway tries to complete the call on the same trunk group.
Total calls for trunk group	Lists the total calls across all trunks in the trunk group.
Total channels available	Number of available channels for the trunk.
Trunk	ID of trunk group member.
Trunk group	Name of the trunk group.
Voice	Number of currently used voice channels on the trunk or total voice calls used by the trunk group.

Related Commands

Command	Description
hunt-scheme least-idle	Specifies the method for selecting an available incoming or outgoing channel.
trunk group	Initiates a trunk group definition.

show voice enum-match-table

To display the rules of an ENUM match table, use the **show voice enum-match-table** command in privileged EXEC mode.

show voice enum-match-table [*table-number* [**sort**]]

Syntax Description

table-number	Specifies the ENUM match table to display. Valid values are 1 through 15.
sort	Sorts the output by table number preference.

Defaults

No default behavior or values

Command Modes

Privileged EXEC

Command History

Release	Modification
12.2(2)XU	This command was introduced.

Usage Guidelines

The **show voice enum-match-table** command displays the ENUM match table rules in the order in which they were defined. The sort parameter changes the display to list the rules from lowest to highest preference.

Examples

The following example displays the rules of ENUM match table number 3 in the order in which they were entered:

```
Router# show voice enum-match-table 3
voice enum_match_table 3
rule 1 5 /^9\(1.*\)/ /+\1/ cisco
rule 2 4 /^9011\(.*\)/ /+1408\1/ arpa
rule 10 1 /^(.*)/ /\1/ e164.cisco.com
```

The following example displays the ENUM rules for match table 3 in order of preference:

```
Router#show voice enum-match-table 3 sort
voice enum-match-table 3
rule 10 1 /^(.*)/ /\1/ e164.cisco.com
rule 2 4 /^9011\(.*\)/ /+1408\1/ arpa
rule 1 5 /^9\(1.*\)/ /+\1/ cisco
```

Related Commands

Command	Description
rule (ENUM configuration)	Defines the ENUM rule.
test enum	Tests the ENUM rule.
voice enum-match-table	Initiates the voice ENUM match table definition.

show voice source-group

To display the details of one or more voice source IP groups, use the **show voice source-group** command in privileged EXEC mode.

show voice source-group [*name* | **sort** [**ascending** | **descending**]]

Syntax Description

name	Specifies the name of the source IP group to display.
sort [**ascending**	**descending**]	Specifies the display order of the source IP groups.

Defaults

Ascending order

Command Modes

Privileged EXEC

Command History

Release	Modification
12.2(2)XU	This command was introduced.

Examples

The following example displays the details of voice source IP group newyork:

```
Router# show voice source-group newyork sort descending
```

Related Commands

Command	Description
voice source-group	Initiates a voice source IP group definition.

show voice translation-profile

To display one or more translation profiles, use the **show voice translation-profile** command in privileged EXEC mode.

show voice translation-profile [*name* | **sort** [**ascending** | **descending**]]

Syntax Description

name	Specifies the name of the translation profile to display.
sort [**ascending** | **descending**]	Specifies the display order of the translation profiles by *name*.

Defaults

Ascending order

Command Modes

Privileged EXEC

Command History

Release	Modification
12.2(2)XU	This command was introduced.

Examples

The following example displays voice translation profile named alpha:

```
Router# show voice translation-profile alpha
```

The following example displays all the voice translation profiles in descending order:

```
Router# show voice translation-profile sort descending
```

Related Commands

Command	Description
voice translation-profile	Initiates a voice translation-profile definition.
voice translation-rule	Initiates a voice translation-rule definition.

show voice translation-rule

To display one or more translation rules, use the **show voice translation-rule** command in privileged EXEC mode.

show voice translation-rule [*number* | **sort** [**ascending** | **descending**]]

Syntax Description

number	Specifies the number of the translation rule to display. Valid values are 1 through 2147483647.
sort [**ascending** | **descending**]	Specifies the display order of the translation rules by *number*.

Defaults

Ascending order

Command Modes

Privileged EXEC

Command History

Release	Modification
12.2(2)XU	This command was introduced.

Examples

The following example displays the translation rule number 5:

```
Router(config)# show voice translation-rule 5
```

The following example displays all the translation rules in descending order:

```
Router(config)# show voice translation-rule sort descending
```

Related Commands

Command	Description
voice translation-rule	Initiates a voice translation-rule definition.
voice translation-profile	Initiates a voice translation-profile definition.

test enum

To test the functionality of an ENUM match table, use the **test enum** command in privileged EXEC mode.

test enum *table-number input-pattern*

Syntax Description

table-number	Specifies the number of the ENUM match table to be tested. Valid values are 1 through 15.
input-pattern	Specifies the SED expression to be resolved using the ENUM match table.

Defaults

No default behavior or values.

Command Modes

Privileged EXEC

Command History

Release	Modification
12.2(2)XU	This command was introduced.

Usage Guidelines

The **test enum** command emulates an ENUM call with the input pattern as the called number. The **contact_list** field in the display contains the URLs returned by the ENUM server.

Examples

Given the following definition for ENUM match-table 3:

```
voice enum_match_table 3
rule 1 5 /^9\(1.*\)/ /+\1/ cisco
rule 2 4 /^9011\(.*\)/ /+1408\1/ arpa
rule 10 1 /^(.*)/ /\1/ e164.cisco.com
```

the following example tests the input string 12345 against ENUM match table 3:

```
Router(config)# test enum 3 12345
tahoe3#contact_list :
              tel:1111
contact_list :
              sip:345789@contact1.alpha.com
contact_list :
              tel:765
contact_list :
              sip:12345@contact1.alpha.com
contact_list :
              sip:987@contact2.alpha.com
contact_list :
              h323:12345@contact2.alpha.com:5060
contact_list :
              h323:12345@contact1.alpha.com:5060
```

```
contact_list :
              h323:12345@contact3.alpha.com:5060
contact_list :
              sip:654@172.18.188.173
contact_list :
              tel:876
enum_test_command: contact_list 62E4E8A4
```

Related Commands

Command	Description
rule (ENUM configuration)	Defines the match and replace patterns for the ENUM rule.
show voice enum-match-table	Displays the configuration for voice ENUM match tables.
voice enum-match-table	Initiates the definition of an ENUM match table.

test source-group

To test the functionality of a source group, use the **test source-group** command in privileged EXEC mode.

test source-group {**carrier-id source** *name* | **h323zone-id** *name* | **ip-address** *ip-address* | **trunk-group-label source** *name*}

Syntax Description

carrier-id source *name*	Specifies the source carrier ID of the source group to be tested.
h32zone-id *name*	Specifies the name of the H.323 zone source group to be tested.
ip-address *ip-address*	Specifies the IP address of the source group to be tested.
trunk-group-label source *name*	Specifies the trunk group label of the source group to be tested.

Defaults

No default behavior or values

Command Modes

Privileged EXEC

Command History

Release	Modification
12.2(2)XU	This command was introduced.

Examples

The following example tests the source group with carrier ID newyork:

```
Router# test source-group carrier-id source newyork
```

The following example tests the source group with H.323 zone id sanjose:

```
Router# test source-group h323zone-id sanjose
```

The following example tests the source group using an IP address:

```
Router# test source-group 172.16.100.100
```

The following example tests the source group with trunk group label losangeles:

```
Router# test source-group trunk-group-label source losangeles
```

Related Commands

Command	Description
show voice source-group	Displays the configuration for voice source IP groups.
voice source-group	Initiates the voice source-group definition.

test voice translation-rule

To test the functionality of a translation rule, use the **test translation-rule** command in privileged EXEC mode.

test voice translation-rule *number input-test-string* [**type** *match-type* [**plan** *match-type*] | **plan** *match-type*]

Syntax Description

number	Specifies the number of the translation rule to be tested. Valid values are 1 through 2147483647.
input-test-string	Specifies the string to be tested by the translation rule.
type *match-type*	(Optional) Valid values for **type** *match-type* are: • abbreviated—Abbreviated representation of the complete number as supported by this network. • any—Any type of called number. • international—Number called to reach a subscriber in another country. • national—Number called to reach a subscriber in the same country, but outside the local network. • network—Administrative or service number specific to the serving network. • reserved—Reserved for extension. • subscriber—Number called to reach a subscriber in the same local network. • unknown—Type of number is unknown by the network.
plan *match-type*	(Optional) Valid values for **plan** *match-type* are: • any—Any type of called number • data • ermes • isdn • national—Number called to reach a subscriber in the same country, but outside the local network. • private • reserved—Reserved for extension. • telex • unknown—Type of number is unknown by the network.

Defaults

No default behavior or values

Command Modes

Privileged EXEC

Command History

Release	Modification
12.2(2)XU	This command was introduced for carrier sensitive routing voice translation profiles.

Examples

The following example tests the functionality of translation rule 85 with string 817185551234:

```
Router# test voice translation-rule 85 817185551234
```

Related Commands

Command	Description
show voice translation-rule	Displays the configuration for voice translation rules.
voice translation-rule	Initiates the translation-rule definition
rule (voice translation-rule)	Defines the translation-rule criteria.

translate (translation profiles)

To associate a translation rule with a voice translation profile, use the **translate** command in voice translation-profile configuration mode. To delete the translation rule from the profile, use the **no** form of this command.

translate {**called** | **calling** | **redirect-called**} *translation-rule-number*

no translate {**called** | **calling** | **redirect-called**} *translation-rule-number*

Syntax Description

called	Associates the translation rule with called numbers.
calling	Associates the translation rule with calling numbers.
redirect-called	Associates the translation rule with redirected called numbers.
translation-rule-number	Number of the translation rule to use for the call translation. Valid values are 1 through 2147483647.

Defaults

No default behavior or values

Command Modes

Voice translation-profile

Command History

Release	Modification
12.2(2)XU	This command was introduced for Carrier Sensitive Routing translation profiles.

Usage Guidelines

Use the **translate** command as part of a voice translation-profile definition. Enter this command for each translation rule that is part of the profile definition.

Examples

The following example defines voice translation profile sjmorning with two translation rules: translation rule 15 for called numbers and translation rule 36 for calling numbers:

```
Router(config)# voice translation-profile sjmorning
Router(cfg-translation-profile)# translate called 15
Router(cfg-translation-profile)# translate calling 36
```

Related Commands

Command	Description
rule (voice translation-rule)	Sets the criteria for the translation-rule.
show voice translation-profile	Displays the configuration of the translation-profile.
translation-profile (dial-peer)	Assigns a translation profile to a dial peer.
translation-profile (source group)	Assigns a translation profile to a source IP group.

Command	Description
translation-profile (trunk group)	Assigns a translation profile to a trunk group.
translation-profile (voice port)	Assigns a translation profile to a voice port.
translation-profile (voice service POTS)	Assigns a translation profile to an NFAS interface.
voice translation-profile	Initiates the translation-profile definition.
voice translation-rule	Initiates the translation-rule definition.

translation-profile (dial-peer)

To assign a translation profile to a dial peer, use the **translation-profile** command in dial-peer configuration mode. To delete the translation profile from the dial peer, use the **no** form of this command.

translation-profile {**incoming** | **outgoing**} *name*

no translation-profile {**incoming** | **outgoing**} *name*

Syntax Description

incoming	Specifies that this translation profile handles incoming calls.
outgoing	Specifies that this translation profile handles outgoing calls.
name	Specifies the name of the translation profile.

Defaults

No default behavior or value

Command Modes

Dial-peer configuration

Command History

Release	Modification
12.2(2)XU	This command was introduced.

Usage Guidelines

Use the **translation-profile** command to assign a pre-defined translation profile to a dial peer.

Examples

The following example assigns the translation profile named westcoast to handle translation of outgoing calls for a dial peer:

```
Router(config)# dial-peer voice 111 pots
Router(config-dial-peer)# translation-profile outgoing westcoast
```

Related Commands

Command	Description
rule (voice translation-rule)	Sets the criteria for the translation-rule.
show voice translation-profile	Displays the configuration of a translation-profile.
translate (translation profiles)	Assigns a translation rule to a translation profile.
voice translation-profile	Initiates the translation-profile definition.
voice translation-rule	Initiates the translation-rule definition.

translation-profile (source group)

To assign a translation profile to a source IP group, use the **translation-profile** command in voice source group configuration mode. To delete the translation profile from the source IP group, use the **no** form of this command.

translation-profile incoming *name*

no translation-profile incoming *name*

Syntax Description

incoming	Specifies that this translation profile handles incoming calls.
name	Specifies the name of the translation profile.

Defaults

No default behavior or values

Command Modes

Source group configuration

Command History

Release	Modification
12.2(2)XU	This command was introduced.

Usage Guidelines

Use the **translation-profile** command to assign a pre-defined translation profile to a source IP group.

Examples

The following example assigns the translation profile named chicago to handle translation of incoming calls for a voice source group:

```
Router(config)# voice source-group alpha
Router(cfg-source-grp)# translation-profile incoming chicago
```

Related Commands

Command	Description
rule (voice translation-rule)	Sets the criteria for the translation-rule.
show voice translation-profile	Displays the configuration of a translation-profile.
translate (translation profiles)	Assigns a translation rule to a translation profile.
voice translation-profile	Initiates the translation-profile definition.
voice translation-rule	Initiates the translation-rule definition.

translation-profile (trunk group)

To assign a translation profile to a trunk group, use the **translation-profile** command in trunk group configuration mode. To delete the translation profile from the trunk group, use the **no** form of this command.

translation-profile {**incoming** | **outgoing**} *name*

no translation-profile {**incoming** | **outgoing**} *name*

Syntax Description

incoming	Specifies that this translation profile handles incoming calls.
outgoing	Specifies that this translation profile handles outgoing calls.
name	Specifies the name of the translation profile.

Defaults

No default behavior or values

Command Modes

Trunk group configuration

Command History

Release	Modification
12.2(2)XU	This command was introduced.

Usage Guidelines

Use the **translation-profile** command to assign a pre-defined translation profile to a trunk group.

Examples

The following example assigns the translation profile named newyork to handle translation of incoming calls for a trunk group:

```
Router(config)# trunk group 10
Router(config-trunk-group)# translation-profile incoming newyork
```

Related Commands

Command	Description
rule (voice translation-rule)	Sets the criteria for the translation-rule.
show voice translation-profile	Displays the configuration of a translation-profile.
translate (translation profiles)	Assigns a translation rule to a translation profile.
voice translation-profile	Initiates the translation-profile definition.
voice translation-rule	Initiates the translation-rule definition.

translation-profile (voice port)

To assign a translation profile to a voice port, use the **translation-profile** command in voice port configuration mode. To delete the translation profile from the voice port, use the **no** form of this command.

translation-profile {**incoming** | **outgoing**} *name*

no translation-profile {**incoming** | **outgoing**} *name*

Syntax Description

incoming	Specifies that this translation profile handles incoming calls.
outgoing	Specifies that this translation profile handles outgoing calls.
name	Specifies the name of the translation profile.

Defaults

No default behavior or values

Command Modes

Voice port configuration

Command History

Release	Modification
12.2(2)XU	This command was introduced.

Usage Guidelines

Use the **translation-profile** command to assign a pre-defined translation profile to a voice port.

Examples

The following example assigns the translation profile named chicago to handle translation of incoming calls and a translation profile names sanjose to handle outgoing calls for a voice port:

```
Router(config)# voice-port 1/0/0
Router(config-voiceport)# translation-profile incoming chicago
Router(config-voiceport)# translation-profile outgoing sanjose
```

Related Commands

Command	Description
rule (voice translation-rule)	Sets the criteria for the translation-rule.
show voice translation-profile	Displays the configuration of a translation-profile.
translate (translation profiles)	Assigns a translation rule to a translation profile.
voice translation-profile	Initiates the translation-profile definition.
voice translation-rule	Initiates the translation-rule definition.

translation-profile (voice service POTS)

To assign a translation profile to an NFAS interface, use the **translation-profile** command in voice service POTS configuration mode. To delete the translation profile from the interface, use the **no** form of this command.

translation-profile [**incoming** | **outgoing**] **controller** [**T1** | **E1**] *unit-number name*

no translation-profile [**incoming** | **outgoing**] **controller** [**T1** | **E1**] *unit-number name*

Syntax Description

incoming	Specifies that this translation profile handles incoming calls.
outgoing	Specifies that this translation profile handles outgoing calls.
T1	Specifies a T1 controller.
E1	Specifies an E1 controller.
unit-number	Specifies the controller unit number.
name	Specifies the name of the translation profile.

Defaults

No default behavior or values

Command Modes

Voice service POTS configuration

Command History

Release	Modification
12.2(2)XU	This command was introduced.

Usage Guidelines

Use the **translation-profile** command to assign a pre-defined translation profile to an NFAS interface.

Examples

The following example assigns to an NFAS interface the translation profile named delta1 to outgoing T1 calls on controller slot 3 and translation profile alpha to incoming T1 calls on controller slot 2:

```
Router(config)# voice service pots
Router(conf-voi-serv)# translation-profile outgoing controller T1 3 delta1
Router(conf-voi-serv)# translation-profile incoming controller T1 2 alpha
```

Related Commands

Command	Description
rule (voice translation-rule)	Sets the criteria for the translation-rule.
show voice translation-profile	Displays the configuration of a translation-profile.
translate (translation profiles)	Assigns a translation rule to a translation profile.
voice translation-profile	Initiates the translation-profile definition.
voice translation-rule	Initiates the translation-rule definition.

trunk group

To define and modify the definition of a trunk group, use the **trunk group** command in global configuration mode. To delete the trunk group, use the **no** form of this command.

trunk group *name*

no trunk group *name*

Syntax Description

name	Specifies the name of the trunk group. Valid names contain a maximum of 63 alphanumeric characters.

Defaults

No default behavior or values

Command Modes

Global configuration

Command History

Release	Modification
12.2(2)XU	This command was introduced.

Usage Guidelines

Use the **trunk group** command to assign a number or a name to a set of trunk characteristics. The set of characteristics, or *profile*, is assigned to specific trunks as part of the usual trunk configuration steps.

The trunk group command initiates the profile definition and switches from global configuration to trunk group configuration mode. Additional commands are available to construct the characteristics of the profile.

Up to 1000 trunk groups can be configured on the gateway.

Examples

The following example assigns the number 5 to a trunk group profile:

```
Router(config)# trunk group 5
Router(config-trunk-group)# carrier-id allcalls
Router(config-trunk-group)# maxcalls voice 500 in
Router(config-trunk-group)# hunt-scheme round-robin even up
Router(config-trunk-group)# translation-profile incoming 3
Router(config-trunk-group)# translation-profile outgoing 2
Router(config-trunk-group)# exit
```

The following example assigns the name newyork to a trunk group profile:

```
Router(config)# trunk group newyork
Router(config-trunk-group)# carrier-id local
Router(config-trunk-group)# maxcalls voice 500
Router(config-trunk-group)# hunt-scheme least-idle
Router(config-trunk-group)# translation-profile incoming 1
Router(config-trunk-group)# translation-profile outgoing 12
Router(config-trunk-group)# exit
```

Related Commands

Command	Description
carrier-id (trunk group)	Identifies the carrier that owns the trunk group.
description (trunk group)	Permits a description to be associated with a trunk group.
hunt-scheme least-idle	Specifies the least-idle channel search method for incoming and outgoing calls.
hunt-scheme least-used	Specifies the least-used channel search method for incoming and outgoing calls.
hunt-scheme longest-idle	Specifies the longest-idle channel search method for incoming and outgoing calls.
hunt-scheme random	Specifies the random channel search method for incoming and outgoing calls.
hunt-scheme round-robin	Specifies the round-robin channel search method for incoming and outgoing calls.
hunt-scheme sequential	Specifies the sequential channel search method for incoming and outgoing calls.
max-calls	Specifies the number of incoming and outgoing voice and data calls that a trunk group can handle.
show trunk group	Displays the configuration of trunk groups.
translation-profile (trunk group)	Defines call number translation profiles for incoming and outgoing calls.

trunkgroup (dial-peer)

To assign a dial peer to a trunk group for trunk group label routing, use the **trunkgroup** command in dial-peer configuration mode. To delete the dial peer from the trunk group, use the **no** form of the command.

trunkgroup *name preference_num*

no trunkgroup *name*

Syntax Description

name	Specifies the label of the trunk group to use for the call. Valid trunk group names contain a maximum of 63 alphanumeric characters.
preference_num	Specifies the preference or priority of the trunk group. Valid values are 1 through 64.

Defaults

Preference = 65

Command Modes

Dial-peer configuration

Command History

Release	Modification
12.1(3)T	This command was introduced.
12.2	This command was integrated into the Cisco IOS Release 12.2
12.2(2)XU	The **preference_num** parameter was added.

Usage Guidelines

Use the **trunkgroup** command to assign an outgoing dial peer as a member of one or more trunk groups. This assignment provides the dial peer with carrier information, a hunt scheme for finding an available channel for the outgoing call, and translation profiles for number translation.

If the dial peer is a member of more than one trunk group, use the *preference_num* value to set the order in which the trunk groups will be used for the dial peer. The smaller value has a higher preference. If two trunk groups have the same *preference_num*, the trunk group that was configured first is used before the other trunk group.

Examples

In the following example, dial peer 112 should use the trunk group east17 and trunk group north5 for outbound dial peer matching. When selecting a trunk group, north5 is used first because it has a higher preference than east17:

```
Router(config)# dial-peer voice 112 pots
Router(config-dial-peer)# trunkgroup east17 3
Router(config-dial-peer)# trunkgroup north5 1
```

Related Commands

Command	Description
debug dialpeer	Initiates dial peer debugging.
show dial-peer voice	Displays the dial peer configuration.
translation-profile (dial-peer)	Defines call number translation profiles for incoming and outgoing calls.

trunk-group (CAS custom)

To assign a CAS trunk to a trunk group, use the **trunk-group** command in CAS custom configuration mode. To delete the CAS trunk from the trunk group, use the **no** form of this command.

trunk-group *name* [*preference_num*]

no trunk-group *name* [*preference_num*]

Syntax Description

name	Specifies the name of the trunk group. Valid trunk group names contain a maximum of 63 alphanumeric characters.
preference_num	(Optional) Specifies the priority of the trunk group member in a trunk group. Valid values are 1 through 64. The smaller value has a higher priority.

Defaults

Preference = 65

Command Modes

CAS custom configuration

Command History

Release	Modification
12.2(2)XU	This command was introduced.

Usage Guidelines

Use the **trunk-group** (CAS custom) command to assign a CAS trunk as a member of a trunk group. This assignment provides the CAS trunk with carrier information, a hunt scheme for finding an available channel for the outgoing call, and translation profiles for number translation.

If more than one CAS trunk is assigned to the same trunk group, the *preference_num* value determines the order by which the trunk group uses the interfaces. The smaller value has a higher preference. If two CAS trunks have the same *preference_num*, the trunk that was configured first is used before the other trunk.

A CAS trunk can belong to only one trunk group.

If the interface is removed from the CAS trunk, the interface is removed automatically from the trunk group. A new non-primary CAS interface is automatically a member of the same trunk group as its primary CAS interface.

Examples

The following example assigns two CAS interfaces to trunk group westcoast. The preference value for ds0-group 2 is lower than for ds0-group 1, which gives ds0-group 2 a higher priority. Trunk group westcoast will use ds0-group 2 first.

```
Router(config)# controller T1 1/0
Router(config-controller)# ds0-group 1 timeslots 1-10 type e&m-fgd
Router(config-controller)# cas-custom 1
Router(config-controller)# trunk-group westcoast 5
Router(config-controller)# exit
```

```
Router(config)# controller T1 1/0
Router(config-controller)# ds0-group 1 timeslots 15-20 type e&m-fgd
Router(config-controller)# cas-custom 2
Router(config-controller)# trunk-group westcoast 3
Router(config-controller)# exit
```

Related Commands

Command	Description
show trunk group	Displays the configuration of the trunk group.

trunk-group (interface)

To assign an ISDN PRI or NFAS interface to a trunk group, use the **trunk-group** command in interface configuration mode. To delete the interface from the trunk group, use the **no** form of this command.

trunk-group *name* [*preference_num*]

no trunk-group *name* [*preference_num*]

Syntax Description

name	Specifies the name of the trunk group. Valid trunk group names contain a maximum of 63 alphanumeric characters.
preference_num	Specifies the priority of the trunk group member in a trunk group. Valid values are 1 through 64.

Defaults

Preference = 65

Command Modes

Serial interface configuration

Command History

Release	Modification
12.1(3)T	This command was introduced.
12.2	This command was integrated into the Cisco IOS Release 12.2
12.2(2)XU	The trunk-group identification was expanded to include alphanumeric characters using the **name** parameter and the **preference_num** parameter was added.

Usage Guidelines

Use the **trunk-group** command to configure an ISDN PRI or NFAS interface as a member of a trunk group. This assignment provides the interface with carrier information, a hunt scheme for finding an available channel for the outgoing call, and translation profiles for number translation.

If more than one interface is assigned to the same trunk group, the *preference_num* value determines the order by which the trunk group uses the interfaces. The smaller value has a higher preference. If two interfaces have the same *preference_num*, the interface that was configured first is used before the other interface.

An interface can belong to only one trunk group. Multiple interfaces can belong to the same trunk group.

If an NFAS interface group is assigned as a member of a trunk group, all the sub-interfaces belong to that trunk group.

If a sub-interface is removed from the NFAS group, the sub-interface is removed automatically from the trunk group.

If a new non-primary NFAS interface is added to the NFAS group, that interface automatically becomes a member of the same trunk group as its primary NFAS interface.

Examples

The following example assigns an ISDN interface to trunk group eastern with a preference of 3.

```
Router(config)# interface Serial2:23
Router(config-if)# no ip address
Router(config-if)# isdn switch-type primary-ni
Router(config-if)# isdn T306 30000
Router(config-if)# isdn T310 10000
Router(config-if)# no cdp enable
Router(config-if)# trunk-group eastern 3
Router(config-if)# exit
```

If another interface were assigned to trunk group eastern with preference 1 or 2, the trunk group would use that interface before the one shown above.

Related Commands

Command	Description
show trunk group	Displays the configuration of the trunk group.

trunk-group (voice port)

To assign a voice port to a trunk group, use the **trunk-group** command in voice port configuration mode. To delete the trunk group, use the **no** form of this command.

trunk-group *name* [*preference_num*]

no trunk-group *name* [*preference_num*]

Syntax Description

name	Specifies the name of the trunk group. Valid trunk group names contain a maximum of 63 alphanumeric characters.
preference_num	Specifies the priority of the trunk group member in a trunk group. Valid values are 1 through 64.

Defaults

Preference = 65

Command Modes

Voice-port configuration

Command History

Release	Modification
12.2(2)XU	This command was introduced.

Usage Guidelines

Use the **trunk-group** command to configure an analog voice port as a member of a trunk group. This assignment provides the voice port with carrier information, a hunt scheme for finding an available channel for the outgoing call, and translation profiles for number translation.

If more than one voice port is assigned to the same trunk group, the *preference_num* value determines the order by which the trunk group uses the voice ports. The smaller value has a higher preference. If two voice ports have the same *preference_num*, the voice port that was configured first is used before the other voice port.

A voice port can belong to only one trunk group. Multiple voice ports can belong to the same trunk group.

Examples

The following example assigns voice port 107 and voice port 109 to trunk group north5. Trunk group north5 uses voice port 109 before using voice port 107 because voice port 109 has preference 1, which is a higher priority than voice port 107 with preference 2.

```
Router(config)# voice port 107
Router(config-voiceport)# translation-profile incoming 7
Router(config-voiceport)# translation-profile outgoing 4
Router(config-voiceport)# trunk-group north5 2
Router(config-voiceport)# exit

Router(config)# voice port 109
Router(config-voiceport)# translation-profile incoming 3
Router(config-voiceport)# translation-profile outgoing 8
```

```
Router(config-voiceport)# trunk-group north5 1
Router(config-voiceport)# exit
```

Related Commands

Command	Description
show trunk group	Displays the configuration of the trunk group.

trunk-group-label (dial-peer)

To specify a trunk group as the source or target of a call, use the **trunk-group-label** command in dial-peer configuration mode. To delete the trunk group label, use the **no** form of the command.

trunk-group-label {**source** | **target**} *name*

no trunk-group-label {**source** | **target**} *name*

Syntax Description

source	Indicates the trunk group as the source of the incoming call.
target	Indicates the trunk group as the target of the outbound call.
name	Specifies the trunk group label. A valid trunk group label contains a maximum of 127 alphanumeric characters.

Defaults

No default behavior or values

Command Modes

Dial-peer configuration

Command History

Release	Modification
12.2(2)XU	This command was introduced.

Usage Guidelines

The originating gateway uses the source trunk group label *name* as a matching key to route the call over an inbound dial peer. The terminating gateway uses the target trunk group label *name* to select a dial peer for routing the outbound call over a POTS line.

If a dial peer has a source (or target) carrier ID already defined, then assigning a source (or target) trunk group label to that same dial peer overrides the source (or target) carrier ID. The same is true for the reverse: if a dial peer has a source (or target) trunk group label defined, then assigning a source (or target) carrier ID for that same dial peer overrides the source (or target) trunk group label.

The name of a trunk group label and carrier ID cannot be the same in dial peers.

Examples

The following example indicates that dial peer 112 should use trunk group label north3 for inbound dial peer matching and trunk group label east17 for outbound dial peer matching:

```
Router(config)# dial-peer voice 112 pots
Router(config-dial-peer)# trunk-group-label source north3
Router(config-dial-peer)# trunk-group-label target east17
```

Related Commands

Command	Description
carrier-id (dial-peer)	Specifies the carrier associated with a VoIP call.
show dial-peer voice	Displays configuration information for dial peers.

trunk-group-label (voice source group)

To define a trunk group label in a source IP group, use the **trunkgroup** command in voice source group configuration mode. To delete the trunk group label, use the **no** form of the command.

trunk-group-label {**source** | **target**} *name*

no trunk-group-label {**source** | **target**} *name*

Syntax Description

source	Indicates the trunk group as the source of the incoming call.
target	Indicates the trunk group as the target of the outbound call.
name	Specifies the trunk group label. A valid trunk group label contains a maximum of 127 alphanumeric characters.

Defaults

No default behavior or values

Command Modes

Voice source group configuration

Command History

Release	Modification
12.2(2)XU	This command was introduced.

Usage Guidelines

The terminating gateway uses the source trunk group label *name* as a search key to find a source IP group for the incoming VoIP call. The gateway uses the target trunk group label *name* to select an outbound dial peer to route the call over a POTS line.

If a source IP group has a source (or target) carrier ID already defined, then assigning a source (or target) trunk group label to that same source IP group overrides the source (or target) carrier ID. The same is true for the reverse: if a source IP group has a source (or target) trunk group label defined, then assigning a source (or target) carrier ID for that same source IP group overrides the source (or target) trunk group label.

The name of a trunk group label and carrier ID of the same type (source or target) cannot be the same in the source IP group.

Examples

The following example indicates that source IP group alpha uses trunk group north3 to search for a source IP group for incoming VOIP calls and trunk group east17 for outbound dial peer matching:

```
Router(config)# voice source-group alpha
Router(cfg-source-grp)# trunk-group-label source north3
Router(cfg-source-grp)# trunk-group-label target east17
```

Related Commands

Command	Description
carrier-id (dial-peer)	Specifies the carrier associated with a VoIP call.
show voice source-group	Displays the configuration for voice source IP groups.

voice enum-match-table

To create an ENUM match table for voice calls, use the **voice enum-match-table** in global configuration mode. To delete the ENUM match table, use the **no** form of this command.

voice enum-match-table *table-number*

no voice enum-match-table *table-number*

Syntax Description

table-number	Specifies the number of the ENUM match table. Valid values are 1 through 15.

Defaults

No default behavior or values

Command Modes

Global configuration

Command History

Release	Modification
12.2(2)XU	This command was introduced.

Usage Guidelines

The ENUM match table is a set of rules for matching incoming calls. When a call comes in, its called number is matched against the match-pattern of the rule with the highest preference.

If it matches, the replacement-pattern is applied to the number. The resulting number and the domain-name of the rule is used to make an ENUM query.

If the called number does not match the matching-pattern, the next rule in order of preference is selected.

Examples

The following example initiates ENUM match table 3 for voice calls:

```
Router(config)# voice enum-match-table 3
Router(config-enum)# rule 1 5/(.*)/ /\1/e164.cisco.com
Router(config-enum)# rule 2 4/^9011\(.*\)/ /\1/e164.arpa
```

In this table, rule 1 matches with any number. The resulting number is the same as the called number. That number and the domain name **e164.cisco.com** are used to make an ENUM query.

Rule 2 matches any number that starts with 9011. The 9011 is removed from the incoming number. The resulting number and the domain name **e164.arpa** are used for the ENUM query.

Suppose an incoming call has a called number of 4085551212. Rule 2 is tested first because it has a higher preference. The first few digits, 4085, do not match the 9011 pattern of rule 2, so rule 1 is tested next. The called number matches rule 1, and the resulting number is 4085551212. This number and e164.cisco.com form the ENUM query (2.1.2.1.5.5.5.8.0.4.e164.cisco.com).

Related Commands

Command	Description
show voice enum-match-table	Displays the configuration of voice ENUM match tables.
rule (ENUM configuration)	Defines the matching, replacement, and rejection patterns for an ENUM match table.
test enum	Tests the functionality of an ENUM match table.

voice source-group

To define a source IP group for voice calls, use the **voice source-group** command in global configuration mode. To delete the source IP group, use the **no** form of this command.

voice source-group *name*

no voice source-group *name*

Syntax Description

name	The maximum length of the source IP group name is 31 alphanumeric characters.

Defaults

No default behavior or values

Command Modes

Global configuration

Command History

Release	Modification
12.2(2)XU	This command was introduced.

Usage Guidelines

Use the **voice source-group** command to assign a name to a set of source IP group characteristics. The terminating gateway uses these characteristics to identify and translate the incoming VoIP call.

Examples

The following example initiates source IP group utah2 for VoIP calls:

```
Router(config)# voice source-group utah2
```

Related Commands

Command	Description
access-list	Defines a list of source groups for identifying incoming calls.
carrier-id (voice source group)	Specifies the carrier handling the VoIP call.
description (voice source group)	Assigns a disconnect cause to a source IP group.
translation-profile (source group)	Assigns a translation-profile to a source IP group.
h323zone-id (voice source group)	Assigns a zone ID to an incoming H.323 call.
trunk-group-label (voice source group)	Specifies the trunk handling the VoIP call.

voice translation-profile

To define a translation profile for voice calls, use the **voice translation-profile** command in global configuration mode. To delete the translation profile, use the **no** form of this command.

voice translation-profile *name*

no voice translation-profile *name*

Syntax Description

name	The maximum length of the voice translation profile name is 31 alphanumeric characters.

Defaults

No default behavior or values

Command Modes

Global configuration

Command History

Release	Modification
12.2(2)XU	This command was introduced.

Usage Guidelines

After translation rules are defined, they are grouped into profiles. The profiles collect a set of rules that, taken together, translate the called, calling, and redirected numbers in specific ways. Up to 1000 profiles can be defined. Each profile must have a unique *name*.

These profiles are referenced by trunk groups, dial peers, source IP groups, voice ports, and interfaces for handling the call translations.

Examples

The following example initiates translation profile westcoast for voice calls. The profile uses translation rules 1, 2, and 3 for the different types of calls.

```
Router(config)# voice translation-profile westcoast
Router(cfg-translation-profile)# translate calling 2
Router(cfg-translation-profile)# translate called 1
Router(cfg-translation-profile)# translate redirect-called 3
```

Related Commands

Command	Description
rule (voice translation-rule)	Defines the call translation criteria.
show voice translation-profile	Displays one or more translation profiles.
translate (translation profiles)	Associates a translation rule with a voice translation profile.

voice translation-rule

To define a translation rule for voice calls, use the **voice translation-rule** command in global configuration mode. To delete the translation rule, use the **no** form of this command.

voice translation-rule *number*

no voice translation-rule *number*

Syntax Description

number	The number identifying the translation rule. Valid values are 1 through 2147483647.

Defaults

No default behavior or values

Command Modes

Global configuration

Command History

Release	Modification
12.2(2)XU	This command was introduced.

Usage Guidelines

Use the **voice translation-rule** command to initiate the definition of a translation rule. Each definition includes up to 15 rules that include SED-like expressions for processing the call translation. A maximum of 128 translation rules are supported.

These translation rules are grouped into profiles that are referenced by trunk groups, dial peers, source IP groups, voice ports, and interfaces.

Examples

The following example initiates translation rule150 that includes two rules:

```
Router(config)# voice translation-rule 150
Router(cfg-translation-rule)# rule 1 reject /^408\(.(\)/
Router(cfg-translation-rule)# rule 2 /\(^...\)853\(...\)/ /\1525\2/
```

Related Commands

Command	Description
rule (voice translation-rule)	Defines the matching, replacement, and rejection patterns for a translation rule.
show voice translation-rule	Displays the configuration of a translation-rule.

voip-incoming translation-profile

To define a translation profile for all incoming VoIP calls, use the **voip-incoming translation-profile** command in global configuration mode. To delete the profile, use the **no** form of this command.

voip-incoming translation-profile *name*

no voip-incoming translation-profile *name*

Syntax Description

name	Specifies the name for the translation profile.

Defaults

No default behavior or values

Command Modes

Global configuration

Command History

Release	Modification
12.2(2)XU	This command was introduced.

Usage Guidelines

Use the **voip-incoming translation-profile** command to globally assign a translation profile for all incoming VoIP calls. The translation profile was previously-defined using the **voice translation-profile** command. The **voip-incoming translation-profile** command does not require additional steps to complete its definition.

If an H.323 call comes in and the call is associated with a source IP group that is defined with a translation-profile, the source IP group translation-profile overrides the global translation-profile.

Examples

The following example assigns the translation-profile named global-definition to all incoming VoIP calls:

```
Router(config)# voip-incoming translation-profile global-definition
```

Related Commands

Command	Description
show voice translation-profile	Displays the configurations for all voice translation profiles.
test voice translation-rule	Tests the voice translation rule definition.
voice translation-profile	Initiates a translation profile definition.

Glossary

AAA—Authentication Authorization and Accounting

CAS—channel-associated signaling

CDR—call detail record

CRM—carrier resource manager

CSM—call switching module

DNS—domain name system

ENUM—E.164 telephone number mapping

GKTMP—gatekeeper transaction message protocol. A proprietary Cisco protocol that allows a third-party application to influence the operation of the Ciscso IOS gatekeeper. See *Gatekeeper Trunk and Carrier Based Routing Enhancements* for information on the role of GKTMP in trunk and carrier routing.

IZCT—inter-zone clear token

NFAS—non-facility associated signaling

OSP—open settlements protocol

PSTN—Public Switched Telephone Network

Redirected call—A call that is redirected by the switch or the gateway to another destination, such as a voice-mail box.

Rejected call—A call that is dropped by the switch or the gateway because of insufficient resources or no available routes to the destination.

SED—stream editor

Source IP Group—A VoIP-side grouping of signaling characteristics that are associated with incoming H.323 or SIP calls.

TDM—time-division multiplexing

TGRM—trunk group resource manager

Trunk Group—A PSTN-side logical grouping of multiple DS1 interfaces with the same signaling characteristics.

UDP—user datagram protocol

VoIP—Voice over IP