



*Router User
Guide*

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ABOUT THIS GUIDE

This guide describes Alcatel's implementation and command usage of BGP4, OSPF, RIP, and multicast routing protocols. It is designed for network managers and administrators who are responsible for the operation of LAN and WAN equipment and are familiar with networks and routing protocols.

Organization

The following table describes the organization and content of this guide.

Table 1 *Guide Organization: Major Sections*

About This Guide	Defines the user audience, describes the document's organization, introduces special notices, and provides information about other Alcatel user guides.
Protocols Overview	Provides high-level information about the routing protocols supported by Alcatel.
Command Line Interface	Describes the command line interface (CLI) and how to access navigation and help features. A review of Alcatel configuration standards is included.
Commands	Describes the individual CLI commands. Commands are organized by protocol and are in alphabetical order. Each entry provides a command description and syntax and usage examples.

Documentation

The following list includes other available and related documentation.

- *Release Notes*
Printed release notes provide the latest information. If release notes are provided with your product, follow the instructions contained within them in addition to those provided in other documentation.
- *Quick Start Guides*
These guides are designed for advanced users who need minimal installation, configuration, and operation information.
- *Installation Guides*
These detailed guides are designed for network managers and technicians who are responsible for the installation of networking equipment in Telco and service provider network environments.
- *Command Reference Guide*
This detailed guide provides a complete alphabetical listing of all non-routing commands including descriptions, syntax, examples, and applicable systems.

- *Configuration Guide*

This guide provides examples of how features are used.

Guides and release notes are available in PDF format on the Alcatel website: **www.alcatel.com**.

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PROTOCOLS OVERVIEW

BGP4

Border Gateway Protocol Version 4 (also referred to as simply BGP) is an exterior routing protocol used for the global Internet.

Once configured, BGP peers first exchange complete copies of their routing tables (including BGP version, router ID, and keep alive hold time), which are usually very large. Thereafter, only incremental updates (deltas) are sent as changes occur to the routing tables. BGP keeps a current version of the routing table for all peers, keep alive packets are sent to ensure that the connection between BGP peers, and notification packets are sent in response to problems and irregularities. This enables longer running BGP sessions to be more efficient than shorter sessions.

BGP's basic unit of routing information is the BGP path, a route to a certain set of classless interdomain routing prefixes. Paths are tagged with various path attributes, including an autonomous systems (AS) path and next-hop. In fact, one of BGP's most important functions is loop detection at the AS level, using the AS path attribute, which is a list of autonomous systems used for data transport.

The syntax of this attribute is made more complex by its need to support path aggregation when multiple paths are collapsed into one in order to simplify further route advertisements. A more simplified view of an AS path is that it is a list of autonomous systems that a route goes through to reach its destination. Loops are detected and avoided by checking for your own AS number in the AS path's received from neighboring autonomous systems. Every time a BGP path advertisement crosses an AS boundary, the next-hop attribute is changed on the boundary router. Conversely, as a BGP path advertisement is passed among BGP speakers in the same AS, the next-hop attribute is left untouched. Consequently, BGP's next-hop is always the IP address of the first router in the next autonomous system, even though this may actually be several hops away. The AS's interior routing protocol is responsible for computing an interior route to reach the BGP next-hop.

This leads to the distinction between internal BGP (IBGP) sessions (between routers in the same AS) and external BGP (EBGP) sessions (between routers in different AS's). Next-hops are only changed across EBGP sessions, but left intact across IBGP sessions. The two most important consequences of this design are the need for interior routing protocols to reach one hop beyond the AS boundary, and for BGP sessions to be fully meshed within an AS.

Since the next-hop contains the IP address of a router interface in the next AS, and this IP address is used to perform routing, the interior routing protocol must be able to route to this address. This means that interior routing tables must include entries one hop beyond the AS boundary. Furthermore, since BGP does not relay routing traffic from one interior BGP session to another (only from an exterior BGP session to an IBGP session or another EBGP session), BGP speakers must be fully meshed.

RFC Compliance The following table provides Alcatel's BGP RFC compliance information.

Table 2 BGP RFC Compliance

RFC	Description
2385	Protection of BGP sessions via the TCP MD5 signature option
1998	An application of the BGP community attribute in multi-home routing
1997	BGP communities attribute
1775	BGP OSPF interaction
1771	Border Gateway Protocol 4 (BGP-4)

OSPF

Open Shortest Path First (OSPF), a link-state routing protocol, is used for routing IP packets. OSPF offers the following advantages:

- Scalability
 - OSPF is designed to operate with larger networks. It does not impose a hop-count restriction and permits its domain to be split into areas for easier management.
- Full subnetting support
 - OSPF can fully support subnetting, including Variable Length Subnet Mask (VLSM).
- Tagged routes
 - Routes can be tagged with arbitrary values. This eases interoperation with Exterior Gateway Protocols (EGPs), which can tag OSPF routes with AS numbers.
- Meshed networks
 - OSPF provides the ability to support complex meshed networks.

The following features are incorporated in Alcatel' implementation of OSPF.

- Intra- and inter-area routing
- Broadcast and point-to-point
- Type 1 & Type 2 AS external routes
- Stub areas
- NSSA – Not-So-Stubby-Area
- Route re-distribution
- Authentication – simple & MD5
- RFC 1583 backwards compatibility
- Equal cost multipath
- Configurable routing interface parameters
- Non-intrusive reconfiguration

RFC Compliance The following table provides Alcatel's OSPF RFC compliance information.

Table 3 OSPF RFC Compliance

RFC	Description
2328	OSPF version 2
1587	OSPF NSSA option
1850	OSPF Version 2 Management Information Base

RIP

Routing Information Protocol (RIP) is an interior gateway protocol (IGP), i.e., it routes traffic within a single autonomous system (AS). RIP uses a distance-vector algorithm with hop count as the metric to determine the best route to a destination.

Update messages are sent at configured intervals and when changes occur in the network topology. These messages are used by routers to update their routing tables to maintain currency with the state of the network. When a router updates its routing table, it transmits update messages to other routers in the network to enable them to update their routing tables.

The following list identifies architectural characteristics of RIP:

- The network path is limited to 15 hops. A destination with a greater number of hops is considered unreachable.
- The time required to determine a next hop and bandwidth could be substantial in a large network.
- A fixed metric is used to select routes. Only the best route with the lowest metric is maintained for a specific destination.

The following features are incorporated into Alcatel' implementation of RIP:

- RIP v1, v2, and v1 compatibility modes
- Configurable timers
- VLSM
- Split-horizon and split-horizon with poison reverse
- Clear text and MD5 authentication
- Redistribution of connected, static, and OSPF routes
- Inbound and outbound filtering policies

RFC Compliance The following table provides Alcatel's RIP RFC compliance information.

Table 4 RIP RFC Compliance

RFC	Description
1058	Routing Information Protocol
2453/STD0056	RIP Version 2
1724	RIP Version 2 MIB extension
2082	RIP-II MD5 Authentication

Multicasting

Traditional multicast routing mechanisms such as Distance Vector Multicast Routing Protocol (DVMRP) and Multicast Open Shortest Path First (MOSPF) were intended for use within regions where groups are densely populated or bandwidth is universally plentiful. When groups, and senders to these groups, are distributed sparsely across a wide area, these “dense mode” schemes do not perform efficiently.

Protocol Independent Multicast (PIM)

Protocol Independent Multicast (PIM) protocols route multicast packets to multicast groups. PIM is protocol independent because it can leverage whichever unicast routing protocol is used to populate unicast routing table. There are two modes of PIM protocol – Dense mode (DM) and Sparse mode (SM). Alcatel supports SM only in version 8.0 and higher.

PIM-DM floods multicast traffic throughout the network initially and then generates prune messages as required. PIM-SM attempts to send multicast data only to networks which have active receivers. This is achieved by having a common Rendezvous Point (RP) known to the senders and receivers and by forming shared trees from the RP to the receivers.

PIM-SM is described in RFC 2362.

Securing Remote Access Using IPSec VPN

The features in version 8.0 and higher allow administrators to form a security tunnel to join two private networks over the Internet. The following examples show how to set up an end-to-end tunnel with a single proposal and pre-shared key authentication, with multiple proposals and pre-shared key authentication, and with an SA Bundle, and pre-shared key authentication.

The corporate network no longer has a clearly defined perimeter inside secure building and locked equipment closets. Increasingly, companies have a need to provide remote access to their corporate resources for the employees on the move.

Traditionally, remote users could access the corporate LAN through dial-up and ISDN lines which were terminated in the corporate remote access servers. However, these point-to-point connection technologies do not scale well to the growing number of remote users and the corresponding increase in the infrastructure investments and maintenance costs.

A solution to meeting the needs of increasing numbers of remote users and for controlling access costs is to provide remote access through the Internet using firewalls and a Virtual Private Network (VPN). Internet Protocol Security (IPSec) keeps the connection safe from unauthorized users.

In a typical IPSec remote access scenario, the mobile user has connectivity to Internet and an IPSec VPN client loaded on their PC. The remote user connects to the Internet through their Internet service provider and then initiates a VPN connection to the IPSec security gateway (the VPN server) of the corporate office, which is typically an always-on Internet connection.

One of the main limitations in providing remote access is the typical remote user connects with a dynamically assigned IP address provided by the ISP. IPSec uses the IP address of users as an index to apply the Internet Key Exchange (IKE) and IPSec policies to be used for negotiation with each peer. When the VPN client has a dynamic IP address, the VPN server cannot access the policies based on the IP address of the client. Instead, the VPN server uses the identity of the VPN client to access the policies.

COMMAND LINE INTERFACE

This chapter introduces the Command Line Interface (CLI) hierarchy and the conventions used to describe it. It also introduces the CLI navigation keys and methods, as well as the available help screens.

Command Types

This guide contains two types of commands: transition, or mode change, commands and standard commands.

Transition commands do not affect the system configuration, they are used to gain access to lower- or next-level commands in the CLI hierarchy. Following each transition command is a brief description, a syntax and usage example, a list of next-level commands, and a list of systems for which the command is applicable.

i **NOTE:** In certain instances, transition commands will select an interface for configuration and access next-level commands. For example, the **configure interface bundle dallas** command accesses the **configure interface bundle** mode and selects or creates the bundle **dallas**.

Standard commands are used to configure the system. Following each standard command is a brief description, a list of parameters and definitions, a syntax and usage example, a list of related commands, and a list of systems for which the command is applicable.

Context-Sensitive Commands

Some commands are *context-sensitive*. Once a module, bundle, or Ethernet port has been selected for configuration, all further configuration applies only to the selected interface. Table 5 shows a context-sensitive command string for a host system. In this example, T1 link 1 remains selected for configuration until you exit from the Alcatel-host/configure/module/t1> prompt.

Table 5 Context-Sensitive Command Sequence

Context-Sensitive Command String	Example
1 Go into the configuration mode.	Alcatel-host> configure terminal
2 Specify the type of interface (T1).	Alcatel-host/configure> module t1
3 Choose the specific interface (T1 link 1).	Alcatel-host/configure> module t1 1
4 From now on, all configuration commands are for T1 link 1 until you exit from module configuration or choose another T1 link.	Alcatel-host/configure/module/t1 >

i **NOTE:** Command strings that require identification of a specific interface are context-sensitive.

Command Conventions

Each command is briefly described and then followed by the complete syntax, which is essentially a map of the command that shows mandatory and optional parameters.

The following tables provide details of the conventions used for syntaxes and examples.

Table 6 Syntax Conventions

For Syntaxes	What it means
normal type	<p>Within syntaxes, “normal type” represents required words that must be entered by the user — except when followed by a parameter setting that is enclosed in angled brackets. In that case, only enter the parameter setting enclosed in the angled brackets.</p> <p>Example 1: Normal type only.</p> <p>In this example, the user enters the word or argument (module) appearing in the syntax in “normal type.”</p> <p>Syntax:</p> <pre>module</pre> <p>Command execution:</p> <pre>module</pre> <p>Example 2: Normal type word or argument that is followed by a second normal type word or argument, which is followed by a parameter setting enclosed in angled brackets.</p> <p>In this example, the user enters the first word or argument “connections,” appearing in normal type, and then only enters the value “4” of the second word or argument.</p> <p>Syntax:</p> <pre>connections connections < n ></pre> <p>Command execution:</p> <pre>connections 4</pre> <p>In other words, the first occurrence of “connections” must be entered because it is not followed by a setting enclosed in angled brackets. The second occurrence of the word “connections” must NOT be entered because it is followed by a setting enclosed in angled brackets. This value of the setting must be entered to execute the command.</p>
[a b c]	<p>Normal brackets “[]” indicate optional keywords or arguments.</p> <p>A vertical bar “ ” separates individual settings.</p> <p>Example:</p> <p>In this example, the user enters the word “timeout;” must specify either for “tcp” or “udp” for a protocol type; and optionally enters a timeout value “n.”</p> <p>Syntax:</p> <pre>timeout protocol_type < tcp udp > [seconds < n >]</pre> <p>Command execution:</p> <pre>timeout udp 3600</pre>
< >	<p>Angled brackets. All parameter settings are enclosed in angled brackets. The user is directed to choose an appropriate setting. In some cases, the parameter name accompanies the required setting.</p>
[]	<p>Optional parameter settings in each syntax are indicated by normal brackets.</p>

Table 7 Example Conventions

For Examples	What it means
--------------	---------------

normal type	Prompts and commands that are part of the main prompt are shown in normal type. Examples: Alcatel-host> Alcatel-host/show>
bold type	All character strings that a user must enter to execute a command are in bold type. Example: Alcatel-host> configure term

Abbreviated Commands

You may enter commands by typing the first few characters of each word in a command string. The Alcatel system recognizes the unique abbreviated entry and executes the command exactly as if you had entered it fully.

For example, to view the currently running system configuration, you may type **show configuration running** at the prompt. You may also type **dis con run** to get the same result. Similarly, you may abbreviate the optional parameter names required by some commands.

For example, a typical entry may be as follows:

```
mlppp mrru 1600 sequence short seg_threshold 1000 differential_delay 100 discriminator 10.1.100.22
```

To save time, you may type the following equivalent abbreviated string:

```
mlppp m 1600 seq short seg 1000 diff 100 dis 10.1.100.22
```

CLI Navigation

The **Tab**, **Esc**, and **Ctrl** keyboard keys may be used to:

- n Move backwards or forwards in the CLI
- n Edit entered command strings
- n Or accelerate the command entry process

Navigation Keys

You may use the **Tab** key to quickly enter each word of a command without typing its full name. For example, to enter the **configure** command, you may type its first two letters and then press **Tab** to complete the entire word. Then, you may specify an item to configure by pressing the **Spacebar** and then pressing **Tab** repeatedly until the desired sub-command appears. Repeat this sequence for each successive sub-command string until the entire command string appears.

You may also use the other keystrokes shown in Figure 1 during command entry. For example, to back up the cursor without deleting any characters, type **Ctrl-B**. To repeat the last command that you entered, type **Ctrl-P**. To go back several commands, type **Ctrl-P** repeatedly until the desired previous command appears. Or, you may go directly back to the main CLI> prompt from anywhere in the command hierarchy by typing **Ctrl-Z**.

Figure 1 Navigation Keys

```

> help edit
key stroke          -- action
-----           -- -----
TAB                 -- command completion
Esc-B               -- go back one word
Esc-F               -- forward one word
Esc-DEL             -- delete one word left to cursor
BackSpace           -- go back and delete one char
Ctrl-A              -- start of line
Ctrl-B / <-         -- go back one char
Ctrl-D / DEL        -- delete a char
                    -- go up one level if empty command
Ctrl-E              -- end of line
Ctrl-F / ->         -- forward one char
Ctrl-K              -- delete line ahead of cursor
Ctrl-L              -- refresh line
Ctrl-N / DN ARROW  -- next command in history
Ctrl-P / UP ARROW  -- previous command in history
Ctrl-U              -- delete entire line
Ctrl-W              -- delete one word left to cursor
>

```

Command Help

Command help is available for navigating the CLI command hierarchy and for assistance with specific commands. You may obtain help by using any of the three commands described below.

Help Type **help** at the main CLI prompt to see the basic Alcatel system help information. Or, type **help** followed by a command name to view information about that command. Figure 2 shows the help screen.

Figure 2 Help Screen

```

> help
?                  -- display commands under this tree
exit [level]      -- exit (level nos ) from the current tree
                  --      'exit' from "top level" terminates CLI
Ctrl-Z            -- exit to top level
tree              -- display tree under current node
type 'help edit'  -- to see editing features
type 'help <cmd>' -- to get help for that command
>

```

Tree You may view a tree that shows all CLI commands, or a tree that shows only the commands associated with the current command mode (or the routing mode for example). Figure 3 shows two command tree examples. If you type **tree** at the main (Alcatel-host> or equivalent) prompt, the entire list of system commands appears. If you type **tree** within a command mode, such as Alcatel-6000/clear> **tree**, the commands associated with this command mode are displayed.

Figure 3 Alcatel CLI Command Tree

```
> tree
xcli
|-- ping
|-- clear
|   |-- cfg_file
|   |-- arp
|   |-- cfg_log
|   |-- command_log
|   |-- snmp_stats
|   |-- counters
|       |-- all
|       |-- ethernet
|       |-- ethernetets
|       |-- bundle
|       |-- bundles
|       |-- avc
|       |-- avcs
|       |-- tunnel
|       |-- tunnels
|-- interface
|   |-- all
|   |-- ethernet
Press any key to continue (q : quit) :
```

**Question Mark Help
Screen**

To view help information for a command category, specific command, or a parameter, type the associated word followed by a space and a question mark (?). For example, if you type a question mark at the main command prompt, the system command categories appear. Figure 4 shows a display of these top-level commands.

Figure 4 ? Help Screen

```

> ?
NAME
  xcli          -- This is root and not a command

SYNTAX
  COMMANDS <cr>

DESCRIPTION
  COMMANDS      -- Any of the following commands can be used

      clear          -- access clear commands
      configure     -- configure from ( flash / network / terminal )
      debug         -- accesses debug commands
      dir           -- directory of files in flash
      erase         -- access erase filesystem commands
      file         -- access file commands
      password     -- Change the user password
      ping         -- invoke ping
      reboot       -- reboot the system
      reload       -- reboot the system
      save         -- save configuration to ( local / network )
      show        -- access show commands
      tclsh       -- To invoke TCL shell
      telnet      -- open a telnet connection
      test        -- access test commands
      trace       -- trace route to destination address or host name
      write       -- write to terminal/network/flash

>

```

i NOTE: The default parameters for specific commands appear in parenthesis.

Global Commands

All **show**, **ping**, and **save** commands are available from any level of the CLI. For example, the global **show** commands allow the user to view current configuration settings, alarms, or tests without exiting the **configure** mode. In (Figure 5), a user has displayed a bundle summary while configuring a new bundle.

Similarly, the **ping** and **save** commands are available at any level of the CLI command. The **ping** command verifies connectivity between the Alcatel system and other network hosts; access to the **save** commands from anywhere in the CLI ensures that your configurations may be saved periodically.

Figure 5 Global Show Command

```
> show configuration
      : Select type of 'configuration' ( Hit Tab )
> dir

CONTENTS OF /flash1:

  size          date          time          name
  -----
6467513      FEB-04-2004    13:51:22     T1000.1223.Z
6771268      APR-01-2004    11:38:42     T1000.Z
      1908      APR-01-2004    11:56:18     system.cfg
      0        FEB-05-2004    07:12:30     oldsystem.cfg
6500329      APR-01-2004    11:49:22     T1000.020404.Z

Total bytes: 19741018
Bytes Free: 12713984
>
```

 **NOTE:** The tab completion feature is not currently available for global commands.

POLICY COMMANDS

This chapter provides information about routing policy commands that are supported by Alcatel.

configure policy

This command provides access to the next-level commands.

next-level commands

configure policy as_path

configure policy community_list

configure policy ip_access_list

configure policy route_map

configure policy as_path

This command configures the autonomous system path filter for BGP.

AS path access lists are used for matching the AS path attribute in a BGP route. An AS path access list succeeds if any “permit” line in the list matches, or fails if any “deny” line matches. Matching proceeds sequentially and stops at the first match.

The regular expression parameter is an as path regular expression. (For regular expression syntax, see “AS Path Regular Expressions” on page 105.) Note that the regular expression must be enclosed in quotation marks. The AS number is the smallest element of a Alcatel regular expression. It is an integer ranging from 0 to 65536; the Alcatel regular expression matcher is AS number-based.

Any number of AS path access list lines may be declared. They are evaluated in the order declared. If neither permit nor deny is specified, the default is “permit.”

parameter	definition
access_list	Access list number Range is 1 - 199.
number	Sequence to insert or delete from an existing AS path entry. Range is 0 - 65535.
action	
deny	Deny AS path.
permit	Permit AS path.
regular_expression	Regular expression to match the AS paths. Enter a quoted string. Refer to AS Path Regular Expressions on page 105 for more information about regular expressions.

syntax:

```
[ no ] policy as_path access_list < n > number < n > action < deny | permit > regular_expression <
“string” >
```

example:

```
Alcatel-host/configure> policy as_path 1 120 permit “100”
```

example:

```
Alcatel-host/configure> policy as_path 1 121 deny “.* 101 .*”
```

applicable systems:

All models.

configure policy community_list

This command accesses next-level commands for adding extended or standard community lists.

Community lists are used for matching the “community” attribute in a BGP route. A community list succeeds if any “permit” line in the list matches, or fails if any “deny” line matches. Matching proceeds sequentially and stops at the first match. A line in a community list is normally said to match if the route being tested contains at least all of the communities listed in the line. That is, it may contain additional communities as well. If the exact-match keyword is used, then it must contain exactly the same communities as listed.

The communities parameter can be:

- local_as
- no_advertise
- no_export
- aa_nn (an integer between 0 and 65,535)
- community (an integer between 1 and 4294967295)

Note that “exact_match” is supported in the community_list as well as at the route_map level. If neither permit nor deny is specified, the default is permit. If no community is specified, any route will be matched, regardless of what communities are present. The route will even be matched if the community path attribute is not present. Any number of community list lines may be declared. They are evaluated in the order declared.

next-level commands

configure policy community_list extended_community

configure policy community_list standard_community

configure policy community_list extended_community

This command configures an extended community list as part of the policy.

parameter	definition
community_list	Extended community list number The range is 100 - 199.
community_index	Community index number The range is 0 - 65535.
action	
deny	Specify a community to reject.
permit	Specify a community to permit.
community	A list of community numbers The range is 1 - 4294967295. This list can contain a maximum of 32 numbers.
generate_local_as	
local_as	Do not send out local AS.
aa_nn	Community number in aa_nn format This list can contain a maximum of 32 numbers.
generate_no_advertise	
no_advertise	Do not advertise to any neighbor.
generate_no_export	
no_export	Do not send to next AS

syntax:

```
[ no ] policy community_list extended_community community_list < n > community_index < n >
action < deny | permit > [ community < n > ] [ generate_local_as < local_as > ]
[ aa_nn < n > ] [ generate_no_advertise < no_advertise > ] [ generate_no_export < no_export > ]
```

example:

```
Alcatel-host/configure> policy community_list extended_community 100 1 deny community 44 45
local_as aa_nn 400:500 no_advertise
```

applicable systems:

All models.

configure policy community_list standard_community

This command configures a standard community list as part of the routing policy.

parameter	definition
community_list	Extended community list number The range is 100 - 199.
community_index	Community index number The range is 0 - 65535.
action	
deny	Specify a community to reject.
permit	Specify a community to permit.
community	A list of community numbers The range is 1 - 4294967295. This list can contain a maximum of 32 numbers.
generate_local_as	
local_as	Do not send out local AS.
aa_nn	Community number in aa_nn format This list can contain a maximum of 32 numbers.
generate_no_advertise	
no_advertise	Do not advertise to any neighbor.
generate_no_export	
no_export	Do not send to next AS

syntax:

```
[ no ] policy community_list standard_community community_list < n > community_index < n >
action < deny | permit > [ community < n > ] [ generate_local_as < local_as > ]
[ aa_nn < n > ] [ generate_no_advertise <no_advertise > ] [ generate_no_export
< no_export > ]
```

example:

```
Alcatel-host/configure> policy community_list standard_community 90 150 permit community
40 45 local_as aa_nn 655:232592 no_advertise
```

example:

```
Alcatel-host/configure/policy> community_list standard_community 90 150 permit community
42949672 no_advertise
```

applicable systems:

All models.

configure policy ip_access_list

This command configures the IP access list for routes.

Ip access lists are used for matching any type of route prefix. An IP access list is said to succeed if any “permit” line in the list matches, or fails, if any “deny” line matches. Matching proceeds sequentially and stops at the first match. A line in an IP access list is said to match according to the rules listed below.

- network netmask

Matches addresses as follows: The bits in the address part of the route being masked that are not covered by “one” bits in net mask must be equal to the corresponding bits in network. The “one” bits in net mask are sometimes referred to as “don’t care” bits, because the policy engine does not care what their values are.

- network netmask mask maskmask

Matches addresses as follows: The first pair of parameters (network, maskmask) match the address part of the route just as in the previous (network netmask) form. The second pair of parameters (mask, jaskmask) are used to match against the mask part of the route being matched in a similar fashion. That is, the route is matched if the address part matches and the bits in the mask that are not covered by “one” bits in net mask are equal to the corresponding bits in mask.

If neither permit nor deny is specified, the default is permit. All kinds of access_list entries may be mixed freely within a list, and there are no restrictions on what the access_list number may be. Any number of IP access list lines may be declared. They are evaluated in the order declared.

parameter	definition
access_list	Access list number The range is 1 - 99
number	Sequence to insert to or delete from an existing access list entry. The range is 0 - 65535.
action	
deny	Route map deny set operation.
permit	Route map permit set operation.
network	Network route (IP address in dotted notation)
netmask	Network mask as wildcard bits (IP address in dotted notation)
mask	Network route’s mask (IP address in dotted notation)
maskmask	Wildcard mask for network route’s mask (in dotted notation)

syntax:

```
[ no ] policy ip_access_list access_list < n > number < n > action < deny | permit > [ network < IP address > ] [ netmask < IP address > ] [ mask < IP address > ] [ maskmask < IP address > ]
```

example:

```
Alcatel-host/configure> policy ip_access_list 1 1 permit network 10.0.0.0 netmask 0.255.255.255
```

This example permits prefixes 10.0.0.0/8, 10.0.0.0/9 and so on.

example:

```
Alcatel-host/configure> policy ip_access_list 1 1 permit network 10.0.0.0 netmask 0.255.255.255  
mask 255.0.0.0 maskmask 0.255.255.255
```

This example restricts the prefixes to 10.0.0.0/8 only.

applicable systems:

All models.

configure policy route_map

This command configures the policy for router route maps.

Route maps are used for general-purpose matching of routes and setting of route attributes. Each route_map is comprised of one or more route_map clauses, of the form shown below.

```
route_map name number [ permit | deny ]
    match statements
    set statements
```

A route_map clause is said to match if each of its match statements matches, according to the rules given below. A route_map is said to succeed if one of its permit clauses matches, and fails if one of its deny clauses matches. Matching proceeds sequentially and stops at the first match. If the route_map succeeds, the actions specified by the set statements in the matched clause are performed.

If neither permit nor deny is specified, the default is permit.

Match statements can be:

- match as_path
- match community
- match ip ip_address

Set statements can be:

- set as_path
- set community
- set local_preference
- set metric
- set origin
- set distance
- set metric_type

parameter	definition
name	Route map name
number	A sequence to insert to or delete from exiting route map. The range is 0 - 65535.
action	
deny	Deny the route map. This is the default value.
permit	Permit the route map.

syntax:

```
[ no ] policy route_map name number [ action < deny | permit > ]
```

example:

```
Alcatel-host/configure> policy route_map Block100 1 permit
```

next-level commands

configure policy route_map commit

configure policy route_map match

configure policy route_map set

applicable systems:

All models.

configure policy route_map match

This command accesses next-level commands for configuring the policy for matching parameters of the routes.

next-level commands

configure policy route_map match as_path

configure policy route_map match community

configure policy route_map match ip

configure policy route_map match as_path

This command matches any of the specified BGP AS path access lists.

parameter	definition
path_list	AS path access list The range is 1 - 199; the maximum list size is 32.

syntax:

[no] policy match as_path path_list < n >

example:

Alcatel-host/configure/policy/route_map Block100 1> **match as_path 1**

next-level commands

configure policy route_map match ip

configure policy route_map match community

applicable systems:

All models.

configure policy route_map match community

This command matches any of the specified BGP community lists.

syntax:

[no] policy match community

example:

Alcatel-host/configure/policy/route_map Block100 1> **match community**

next-level commands

configure policy route_map match as_path

configure policy route_map match ip

applicable systems:

All models.

configure policy route_map match ip ip_address

This command distributes routes matching the prefix against any of the specified IP access lists.

parameter	definition
ip_list	Ip access list number(s) Enter a list of numbers. The range is 1 - 199. A maximum of 32 numbers can be in the list.

syntax:

```
[ no ] match ip ip_address ip_list < n >
```

example:

```
Alcatel-host/configure/policy/route_map Block100 1> match ip ip_address 20
```

applicable systems:

All models.

configure policy route_map set

This command provides access to next-level commands to set parameters for the routes.

next-level commands

configure policy route_map set as_path

configure policy route_map set community

configure policy route_map set distance

configure policy route_map set local_preference

configure policy route_map set metric

configure policy route_map set metric_type

configure policy route_map set origin

configure policy route_map set as_path

This command configures a character string for a BGP AS-path attribute.

parameter	definition
prepend	AS path access list Enter a list of numbers. The range is 1 - 65535; the maximum list size is 32.
tag	Set tag as an AS path attribute. Enter a number.

syntax:

```
[ no ] set as_path [ prepend < n > ] [ tag < n > ]
```

example:

```
Alcatel-host/configure/policy/route_map Block100 1> set as_path prepend 100 250 tag 0
```

related commands

```
configure policy route_map set community
configure policy route_map set distance
configure policy route_map set local_preference
configure policy route_map set metric
configure policy route_map set metric_type
configure policy route_map set origin
```

applicable systems:

All models.

configure policy route_map set community

This command configures the policy for community attributes.

Set the community attribute to the given value or list of values. If the additive keyword is specified, the list of values augments any communities already present. If the additive keyword is not specified, the list of values overwrites any communities already present.

parameter	definition generate_
number	Community number (unsigned) The range is 1 - 4294967294 The maximum numbers in the list is 32.
aa_nn	Community number in aa_nn format Enter a number or a list of numbers separated by spaces. The maximum numbers in the list is 32
generate_additive additive	Add to the existing community.
generate_local_as local_as	Do not send outside local AS.
generate_no_advertise no_advertise	Do not advertise to any neighbor.
generate_no_export no_export	Do not send to next AS

syntax:

```
[ no ] set community number [ < n > ] [aa_nn < n > ] [ generate_additive < additive > ]
[ generate_local_as < local_as > ] [ generate_no_advertise < no_advertise > ]
[ generate_no_export < no_export > ]
```

example:

```
Alcatel-host/configure/policy/route_map Block100 1> set community aa_nn 500:60
```

related commands

```
configure policy route_map set as_path
configure policy route_map set distance
configure policy route_map set local_preference
configure policy route_map set metric
configure policy route_map set metric_type
configure policy route_map set origin
```

applicable systems:

All models.

configure policy route_map set distance

This command sets the BGP protocol preference for the path attribute.

parameter	definition
distance	Default preference value The range is 0 - 255.

syntax:

```
[ no ] set distance distance < n >
```

example:

```
Alcatel-host/configure/policy/route_map Block100 1> set distance 20
```

related commands

configure policy route_map set as_path

configure policy route_map set community

configure policy route_map set local_preference

configure policy route_map set metric

configure policy route_map set metric_type

configure policy route_map set origin

applicable systems:

All models.

configure policy route_map set local_preference

This command configures the BGP local preference path attribute.

parameter	definition
local_preference	Preference value The range is 1 - 4292967294.

syntax:

```
[ no ] set local_preference local_preference < n >
```

example:

```
Alcatel-hostconfigure/policy/route_map Block100 1> set local_preference 50
```

related commands

configure policy route_map set as_path

configure policy route_map set community

configure policy route_map set distance

configure policy route_map set metric

configure policy route_map set metric_type

configure policy route_map set origin

applicable systems:

All models.

configure policy route_map set metric

This command configures the metric value for the destination routing protocol.

parameter	definition
metric	Metric value The range is 1 - 4294967294.

syntax:

```
[ no ] set metric metric < n >
```

example:

```
Alcatel-host/configure/policy/route_map Block100 1> set metric 120
```

related commands

```
configure policy route_map set as_path
configure policy route_map set community
configure policy route_map set distance
configure policy route_map set local_preference
configure policy route_map set metric_type
configure policy route_map set origin
```

applicable systems:

All models.

configure policy route_map set metric_type

This command configures the metric type for a route.

parameter	definition
type	Internal
internal	Use the IGP metric as the MED for BGP.

syntax:

```
[ no ] set metric_type type < internal >
```

example:

```
Alcatel-host/configure/policy/route_map Block100 1> set metric_type internal
```

related commands

```
configure policy route_map set as_path  
configure policy route_map set community  
configure policy route_map set distance  
configure policy route_map set local_preference  
configure policy route_map set metric  
configure policy route_map set origin
```

applicable systems:

All models.

configure policy route_map set origin

This command configures the origin value for the BGP route.

parameter	definition
origin	
egp	EGP protocol
igp	IGP protocol
incomplete	Unknown protocol type

syntax:

```
[ no ] set origin origin < egp | igp | incomplete >
```

example:

```
Alcatel-host/configure/policy/route_map Block100 1> set origin igp
```

next-level commands

```
configure policy route_map set origin egp
```

```
configure policy route_map set origin igp
```

```
configure policy route_map set origin incomplete
```

applicable systems:

All models.

GENERIC ROUTING COMMANDS

This chapter contains routing commands that are not protocol specific. These commands can be used interchangeably with the three routing protocols supported by Alcatel.

configure router

This command provides access to next-level commands.

next-level commands

configure router routerid

configure router routerid

This command configures a router for routing operation.

syntax:

[no] router routerid < *IP address* >

example:

Alcatel-host/configure> **router routerid 10.10.10.10**

applicable systems:

All models.

show ip routes

This command displays IP routing information for Ethernet ports.

parameter	definition
network	Network IP address Enter an IP address.
mask	Network mask Enter a netmask address
protocol	
all	All protocols
bgp	Border Gateway protocol (BGP)
connected	Connected routes
ospf	Open Shortest Path First protocol (OSPF)
rip	Routing Information Protocol (RIP)
static	Static routes
database	
rib	RIB routes
fib	FIB routes

syntax:

```
show ip routes [ network < IP address > ] [ mask < netmask > ] [ protocol < all | bgp | connected |
ospf | rip | static > ] [ database < rib | fib > ]
```

The following table provides parameter definitions for the following screen display examples.

Table 8 Parameter Definitions

term	definition
Network	Indicates the address of the remote network.
Next Hop	Specifies the address of the next router to the remote network
Interface	Specifies the interface through which the specified network can be reached.
PVC >	Virtual (logical) circuit identification number.
Distance	The administrative distance for the route.
Metric	The metric for the route.

By default, information is displayed for all routes in the routing table. To display only specific route information, specify the appropriate protocol or the network mask.

example:

To display all routes, issue the **show ip routes** command.

example:

To display the route for a specific network and subnet, issue the **show ip routes network 123.1.2.0 mask 255.255.255.0** command.

example:

To display the connected ip routes, issue the **show ip routes connected** command.

example:

To display static routes, issue the **show ip routes static** command.

example:

To display RIP routes, issue the **show ip routes rip** command.

example:

To display ospf routes, issue the **show ip routes ospf** command.

example:

```
Alcatel-host/show> ip routes bgp
```

The following screen display example is a typical display showing the destination IP address, metric, netmask and gateway, status, Ethernet interface, and type of route.

applicable systems:

All models.

BGP4 CLEAR COMMANDS

Use BGP **clear** commands to clear bgp configuration settings.

clear ip bgp

This command provides access to the following next-level commands.

syntax:

clear ip bgp

next-level commands

clear ip bgp all

clear ip bgp group

clear ip bgp neighbor

example:

Alcatel-host> **clear ip bgp**

applicable systems:

All models.

clear ip bgp all

This command removes all BGP neighbor connections.

syntax:

```
clear ip bgp all
```

example:

```
Alcatel-host> clear ip bgp all
```

related commands

clear ip bgp group

clear ip bgp neighbor

applicable systems:

All models.

clear ip bgp group

This command removes all connections for a BGP group.

parameter	definition
group_name	Name of the group

syntax:

```
clear ip bgp group group_name < name >
```

example:

```
Alcatel-host> clear ip bgp group north
```

In this example, all BGP connections that belong to neighbor group **north** will be cleared.

related commands

```
clear ip bgp all
```

```
clear ip bgp neighbor
```

applicable systems:

All models.

clear ip bgp neighbor

This command removes a specified BGP neighbor connection.

parameter	definition
ip_address	The IP address of the neighbor Enter an IP address (in dotted notation) to be cleared.
remote_as	The AS number of the remote neighbor to be cleared. The range is from 1 - 65535.

syntax:

```
clear ip bgp neighbor ip_address < IP address > remote_as < n >
```

example:

```
Alcatel-host> clear ip bgp neighbor 10.1.1.1 200
```

related commands

```
clear ip bgp all
```

```
clear ip bgp group
```

applicable systems:

All models.

BGP4 CONFIGURE COMMANDS

Use BGP configure commands to configure all BGP4 parameters.

configure router bgp

This command configures BGP routing protocol on a router and provides access to the next-level commands listed below.

parameter	definition
as_number	The number of an autonomous system. The range is 1 - 65535.

syntax:

```
[ no ] router bgp as_number < n >
```

example:

```
Alcatel-host/configure> router bgp 10
```

next-level commands

```
configure router bgp aggregate_address
configure router bgp always_compare_med
configure router bgp distance
configure router bgp default_metric
configure router bgp group
configure router bgp neighbor
configure router bgp redistribute
```

applicable systems:

All models.

configure router bgp aggregate_address

This command is used to aggregate routes.

parameter	definition
network	Network IP address in dotted notation
mask	Network subnet mask address in dotted notation
generate_as_set as_set	Generates AS path information Form a verbose aggregate, whose AS path contains a leading AS sequence representing the common leading sequence of all contributing routes, and whose AS path contains a trailing AS set representing all ASes in all contributing paths that could not be included in the AS sequence. By default, this feature is off, and the AS path is truncated when the aggregate is formed.
generate_summary_only summary_only	Filters more specific routes from updates Suppresses transmission of any contributing routes if an aggregate exists. Note that the contributing route will not be sent even if an outgoing route_map blocks the sending of the aggregate itself. This cannot be combined with the suppress_map parameter.
suppress_map	Name of the route map to suppress Uses the named route_map to suppress the transmission of selected contributing routes. Contributing routes that do not match the route_map will not be suppressed. This cannot be combined with the summary_only parameter.
advertise_map	Name of route map to control attribute advertisement Selects the routes that contribute to the aggregate. The aggregate will only be formed if matching routes exist. Only the matching routes will be suppressed if summary_only or suppress_map are configured.
attribute_map	Name of route map for setting attributes Specifies attributes to be set on the aggregate when it is transmitted.

syntax:

```
[ no ] aggregate_address network < IP address > mask < subnet mask > [ generate_as_set
< as_set > ] [ generate_summary_only < summary_only > ] [ suppress_map < name > ]
[advertise_map < name > ] [ attribute_map < name > ]
```

example:

```
Alcatel-host/configure/router/bgp 10> aggregate_address 100.3.0.0 255.255.0.0
```

related commands

configure router bgp always_compare_med

configure router bgp distance

configure router bgp default_metric

configure router bgp group

configure router bgp neighbor

configure router bgp redistribute

applicable systems:

All models.

configure router bgp always_compare_med

This command configures a router to allow the comparison of the multi-exit discriminator for paths from neighbors in different autonomous systems.

Normally, MED comparison is done on paths within the same autonomous system. This command allows the comparison to be made for paths received from other autonomous systems.

syntax:

[no] always_compare_med

example:

```
Alcatel-host/configure/router/bgp 10> always_compare_med
```

related commands

configure router bgp aggregate_address

configure router bgp distance

configure router bgp default_metric

configure router bgp group

configure router bgp neighbor

configure router bgp redistribute

applicable systems:

All models.

configure router bgp default_metric

This command configures the default metric value for redistributed BGP routes.

This command forces the routing protocol to use the same metric value for all redistributed routes.

parameter	definition
default_metric	The default metric value. The range is 1 - 4294967294.

syntax:

```
[ no ] default_metric default_metric < n >
```

example:

```
Alcatel-host/configure/router/bgp 10> default_metric 2000
```

related commands

```
configure router bgp aggregate_address
configure router bgp always_compare_med
configure router bgp distance
configure router bgp group
configure router bgp neighbor
configure router bgp redistribute
```

applicable systems:

All models.

configure router bgp distance

This command changes the default distance value on a router.
Higher values are preferred.

parameter	definition
distance	Default preference value The range is 0-255; the default is 170.

syntax:

[no] distance distance < n >

example:

Alcatel-host/configure/router/bgp 10> **distance 20**

Table 9 Default Route Preference (Administrative Distance) Values

How Route is Learned	Default Preference	Command to Modify Default Preference
Directly connected network	0	Not configurable.
Static	1	Not configurable.
OSPF non-external route	10	configure router ospf distance ospf non_external
RIP	100	configure router rip distance
Generated or aggregate	130	Applicable to BGP only, and is not configurable.
OSPF AS external routes	150	configure router ospf distance ospf external
BGP	170	configure router bgp distance

related commands

configure router bgp aggregate_address
configure router bgp always_compare_med
configure router bgp default_metric
configure router bgp group
configure router bgp neighbor
configure router bgp redistribute

applicable systems:

All models.

configure router bgp group

This command configures BGP groups.

Neighbors with the same update policies are more easily managed when they are in groups. Group organization simplifies configuration and streamlines the update process. Neighbor group members inherit all configuration options of a group. The BGP group sub commands are similar to those found under the neighbor tree, but they are applied to all neighbors in the group.

parameter	definition
name	Group name to be configured
group_type	
external	External routing group Default group name = AlcatelBgpExternal
external_rt	External routing group Default group name = AlcatelBgpExternalRt
internal	Internal routing group Default group name = AlcatelBgpInternal

syntax:

```
[ no ] group name < name > group_type < external | external_rt | internal |
internal_rt >
```

example:

```
Alcatel-host/configure/router/bgp 10> group toronto internal
```

next-level commands

```
configure router bgp group distribute_list
configure router bgp group filter_list
configure router bgp group next_hop_self
configure router bgp group password
configure router bgp group remove_private_AS
configure router bgp group route_map
```

applicable systems:

All models.

configure router bgp group distribute_list

This command configures filter updates to this group.

parameter	definition
access_list	IP access list number The range is 1-199.
filter_option	
out	Outbound direction

syntax:

```
[ no ] distribute_list access_list < n > filter_option < out >
```

example:

```
Alcatel-host/configure/router/bgp 10/group toronto internal> distribute_list 101 out
```

related commands

```
configure router bgp group filter_list  
configure router bgp group next_hop_self  
configure router bgp group password  
configure router bgp group remove_private_AS  
configure router bgp group route_map
```

applicable systems:

All models.

configure router bgp group filter_list

This command configures BGP filters for a specified group.

parameter	definition
access list	AS path access list The range is 1-199.
filter_option	
out	Outbound direction

syntax:

[no] filter_list access list < n > filter_option < out >

example:

Alcatel-host/configure/router/bgp 10/group toronto internal> **filter_list 103 out**

related commands

configure router bgp group distribute_list
configure router bgp group next_hop_self
configure router bgp group password
configure router bgp group remove_private_AS
configure router bgp group route_map

applicable systems:

All models.

configure router bgp group next_hop_self

This command disables the next hop calculation for all peers in the group.

syntax:

next_hop_self

example:

Alcatel-host/configure/router/bgp 10/group blue external> **next_hop_self**

related commands

configure router bgp group distribute_list

configure router bgp group filter_list

configure router bgp group password

configure router bgp group remove_private_AS

configure router bgp group route_map

applicable systems:

All models.

configure router bgp group password

This command configures the TCP MD5 password to enable MD5 authentication for a BGP group.

parameter	definition
md5_password	TCP MD5 password (string) for the group Enter a word.

syntax:

```
[ no ] password md5_password < string >
```

example:

```
Alcatel-host/configure/router/bgp 10/group toronto internal> password rt56htd
```

related commands

```
configure router bgp group distribute_list
configure router bgp group filter_list
configure router bgp group next_hop_self
configure router bgp group remove_private_AS
configure router bgp group route_map
```

applicable systems:

All models.

configure router bgp group remove_private_AS

This command removes the private AS number from updates that are sent out.

syntax:

[no] remove_private_AS

example:

Alcatel-host/configure/router/bgp 10/group toronto internal> **remove_private_AS**

related commands

configure router bgp group distribute_list

configure router bgp group filter_list

configure router bgp group next_hop_self

configure router bgp group password

configure router bgp group route_map

applicable systems:

All models.

configure router bgp group route_map

This command configures a route map to a BGP group.

This command can only be applied in the outbound direction.

parameter	definition
route_map	Route map name
route_map_options	
out	Outbound direction

syntax:

```
[ no ] route_map route_map < name > route_map_options < out >
```

example:

```
Alcatel-host/configure/router bgp 10/group toronto internal> route_map foo out
```

related commands

```
configure router bgp group distribute_list
configure router bgp group filter_list
configure router bgp group next_hop_self
configure router bgp group password
configure router bgp group remove_private_AS
```

applicable systems:

All models.

configure router bgp neighbor

This command configures a BGP neighbor.

parameter	definition
IP address	The IP address of the neighbor in dotted notation
remote_as	The AS number The range is 1 - 65535.

syntax:

[no] neighbor IP address < *IP address* > remote_as < n >

example:

Alcatel-host/configure/router/bgp 10> **neighbor 101.101.1.2 4**

next-level commands

configure router bgp neighbor advertisement_interval

configure router bgp neighbor allowbadid

configure router bgp neighbor default_originate

configure router bgp neighbor description

configure router bgp neighbor distribute_list

configure router bgp neighbor ebgp_multihop

configure router bgp neighbor filter_list

configure router bgp neighbor keep

configure router bgp neighbor logupdown

configure router bgp neighbor maximum_prefix

configure router bgp neighbor neighbor_group

configure router bgp neighbor next_hop_self

configure router bgp neighbor password

configure router bgp neighbor route_map

configure router bgp neighbor timers

configure router bgp neighbor update_source

related commands

configure router bgp aggregate_address

configure router bgp always_compare_med

configure router bgp distance

configure router bgp default_metric

configure router bgp group

configure router bgp redistribute

applicable systems:

All models.

configure router bgp neighbor advertisement_interval

This command configures the minimum time interval for sending BGP route updates.

parameter	definition
advertisement_interval	Time, in seconds The range is 1 - 600 seconds.

syntax:

```
[ no ] advertisement_interval advertisement_interval < n >
```

example:

```
Alcatel-host/configure/router/bgp 10/neighbor 101.101.1.2 4> advertisement_interval 60
```

applicable systems:

All models.

configure router bgp neighbor allowbadid

This command permits BGP sessions to be established with routers that represent their router ID as 0.0.0.0 or 255.255.255.255.

syntax:

[no] allowbadid

example:

Alcatel-host/configure/router/bgp 10/neighbor 101.101.1.2 4> **allowbadid**

applicable systems:

All models.

configure router bgp neighbor default_originate

This command sends the default route to the neighbor.

parameter	definition
route_map	The name of the route map

syntax:

```
[ no ] default_originate [ route_map < name > ]
```

example:

```
Alcatel-host/configure/router/bgp 10/neighbor 101.101.1.2 4> default_originate altmap5
```

applicable systems:

All models.

configure router bgp neighbor description

This command describes or identifies a neighbor router.

parameter	definition
neighbor_description	Text string in quotes describing neighbor

syntax:

```
[ no ] description neighbor_description <“string” >
```

example:

```
Alcatel-host/configure/router/bgp 10/neighbor 101.101.1.2 4> description “foo1”
```

applicable systems:

All models.

configure router bgp neighbor distribute_list

This command configures filter updates to or from this neighbor.

parameter	definition
access_list	The IP access list number. The range is 1 - 199.
filter_option	
in	Inbound filter list

syntax:

[no] distribute_list access_list < n > filter_option < in >

example:

Alcatel-host/configure/router/bgp 10/neighbor 101.101.1.2 4> **distribute_list 101 in**

applicable systems:

All models.

configure router bgp neighbor ebgp_multihop

This command configures multihop EBGP on a neighbor.

syntax:

[no] ebgp_multihop

example:

Alcatel-host/configure/router/bgp 10/neighbor 101.101.1.2 4> **ebgp_multihop**

applicable systems:

All models.

configure router bgp neighbor filter_list

This command configures BGP filters.

parameter	definition
access_list	AS path access list The range is 1 - 199.
access_list_option	
in	Inbound filter list

syntax:

[no] filter_list access_list < n > access_list_option < in >

example:

Alcatel-host/configure/router/bgp 10/neighbor 101.101.1.2 4> **filter_list 103 in**

applicable systems:

All models.

configure router bgp neighbor keep

This command configures neighbor route storage options.

parameter	definition
keep_option	
all	Keep all non-active routes
none	Don't store non-active routes

syntax:

keep keep_option < all | none >

example:

Alcatel-host/configure/router/bgp 10/neighbor 10.10.20.1 2> **keep all**

applicable systems:

All models.

configure router bgp neighbor logupdown

This command configures logging of established state transition changes of a neighbor.

syntax:

[no] logupdown

example:

Alcatel-host/configure/router/bgp10/neighbor 101.101.1.2 4> **logupdown**

applicable systems:

All models.

configure router bgp neighbor maximum_prefix

This command configures the maximum number of BGP routes to be accepted.

If the neighbor sends more prefixes than are configured, the connection to this neighbor will be broken.

parameter	definition
prefix_number	Maximum prefix limit The range is 1 - 1000000.

syntax:

```
maximum_prefix prefix_number < n >
```

example:

```
Alcatel-host/configure/router/bgp 10/neighbor 101.101.1.2 4> maximum_prefix 100000
```

applicable systems:

All models.

configure router bgp neighbor neighbor_group

This command configures a neighbor to a specific group.

parameter	definition
neighbor_group	The name of a neighbor group.

syntax:

[no] neighbor_group neighbor_group < name >

example:

Alcatel-host/configure/router/bgp 10/neighbor 101.101.1.2 4> **neighbor_group internal-group**

applicable systems:

All models.

configure router bgp neighbor next_hop_self

This command disables the next hop calculation for this neighbor.

syntax:

next_hop_self

example:

Alcatel-host/configure/router/bgp 10/neighbor 10.10.20.1 2> **next_hop_self**

applicable systems:

All models.

configure router bgp neighbor password

This command configures a password for md5 authentication.

parameter	definition
md5_password	TCP MD5 password for the BGP session Enter a word (maximum 80 characters).

syntax:

md5_password < string >

example:

```
Alcatel-host/configure/router/bgp 10/neighbor 10.10.20.1 2> md5_password asdf
```

applicable systems:

All models.

configure router bgp neighbor route_map

This command applies a route map to a neighbor.

A similar command exists under the group tree for applying route_map to a group of neighbors in the outbound direction.

parameter	definition
route_map	The name of a route map
route_map_options	Filter options
in	Inbound direction

syntax:

[no] route_map route_map < name > route_map_options < in >

example:

Alcatel-host/configure/router/bgp 10/neighbor 100.50.23.3 4> **route_map B01 in**

applicable systems:

All models.

configure router bgp neighbor timers

This command configure keepalive timers for a neighbor (peer).

The holdtime timer value is calculated as three times the value of the keepalive timer.

parameter	definition
keepalive	The keepalive interval The range is 2 - 21845; the default is 60.

syntax:

[no] timers keepalive < n >

example:

```
Alcatel-host/configure/router/bgp 10/neighbor 101.101.1.2 4> timers 120
```

applicable systems:

All models.

configure router bgp neighbor update_source

This command configures the source of BGP TCP connections for a specified neighbor as the IP address specified, instead of the IP address of a physical interface.

This address will be used as the source address for routing updates.

syntax:

[no] update_source < *IP address* >

example:

Alcatel-host/configure/router/bgp 10/neighbor 101.101.1.2 4> **update_source 10.10.2.1**

applicable systems:

All models.

configure router bgp redistribute

This command provides access to the following next-level commands.

Redistribution causes routes from other protocols to be exported via the current protocol. Routes from the current protocol are always exported, some protocols may provide additional policy features that allow the suppression of protocol routes.

next-level commands

configure router bgp redistribute connected

configure router bgp redistribute ospf

configure router bgp redistribute rip

configure router bgp redistribute static

related commands

configure router bgp aggregate_address

configure router bgp always_compare_med

configure router bgp distance

configure router bgp default_metric

configure router bgp group

configure router bgp neighbor

configure router bgp redistribute connected

This command redistributes interface routes.

parameter	definition
metric	Default metric The range is 0 - 4294967294.
route_map	Name of the route map to use

syntax:

```
[ no ] redistribute connected [ metric < n > ] [ route_map < name > ]
```

example:

```
Alcatel-host/configure/router/bgp 10> redistribute connected metric 5000
```

related commands

```
configure router bgp redistribute ospf
```

```
configure router bgp redistribute rip
```

```
configure router bgp redistribute static
```

applicable systems:

All models.

configure router bgp redistribute ospf

This command configures the router to redistribute OSPF routes.

parameter	definition
metric	The default metric The range is 0 - 4294967294.
route_map	Name of the route map to use

syntax:

```
[ no ] redistribute ospf [ metric < n > ] [ route_map < name > ]
```

example:

```
Alcatel-host/configure/router/bgp 10> redistribute ospf metric 12000
```

related commands

```
configure router bgp redistribute connected
```

```
configure router bgp redistribute rip
```

```
configure router bgp redistribute static
```

applicable systems:

All models.

configure router bgp redistribute rip

This command configures a router to redistribute RIP routes.

parameter	definition
metric	The default metric The range is 0 - 4294967294.
route_map	Name or ID of the route map to use

syntax:

```
[ no ] redistribute rip [ metric < n > ] [ route_map < name > ]
```

example:

```
Alcatel-host/configure/router/bgp 10> redistribute rip route_map east8
```

related commands

```
configure router bgp redistribute connected
```

```
configure router bgp redistribute ospf
```

```
configure router bgp redistribute static
```

applicable systems:

All models.

configure router bgp redistribute static

This command configures a router to redistribute static routes.

parameter	definition
metric	The default metric The range is 0 - 4294967294.
route_map	Name of the route map to use

syntax:

```
[ no ] redistribute static [ metric < n > ] [ route_map < name > ]
```

example:

```
Alcatel-host/configure/router/bgp 10> redistribute static metric 25
```

related commands

```
configure router bgp redistribute connected
```

```
configure router bgp redistribute ospf
```

```
configure router bgp redistribute rip
```

applicable systems:

All models.

BGP4 SHOW COMMANDS

Use BGP show commands to display all configured BGP information.

show ip bgp

This command accesses the following next-level show commands.

next-level commands

show ip bgp aggregate_address

show ip bgp community

show ip bgp groups

show ip bgp neighbors

show ip bgp paths

show ip bgp regexp

show ip bgp summary

show ip bgp table

show ip bgp aggregate_address

This command displays a list of configured aggregate addresses.

parameter	definition
address	Aggregate address Enter an IP address.
mask	Aggregate mask Enter a subnet mask.

syntax:

```
show ip bgp aggregate_address [ address < IP address > [ mask < subnet mask > ] ]
```

example:

```
Alcatel-host> show ip bgp aggregate_address address 100.12.23.0 mask 255.255.255.0
```

applicable systems:

All models:

show ip bgp community

This command displays routes that match BGP communities.

parameter	definition
number	Community number (enter a list of unsigned numbers) The maximum list size is 10. The range is 1 - 4294967294
aa_nn	Community number in aa_nn format Enter a list of strings separated by spaces. The maximum list size is 10 numbers.
match_local_as	
local_as	Do not send outside local AS (well-known community)
match_no_advertise	
no_advertise	Do not advertise to any peer (well-known community)
match_no_export	
no_export	Do not export to next AS (well-known community)
match_exact_match	
exact_match	Exact match of the communities

syntax:

```
show ip bgp community [ number < n > ] [ aa_nn < n > ] [ match_local_as < local_as > ]
[ match_no_advertise < no_advertise > ] [ match_no_export < no_export > ]
[ match_exact_match < exact_match > ]
```

example:

```
Alcatel-host> show ip bgp community aa_nn 0:999
```

Table 10 Status and Origin Codes

Status codes

* (valid)	The table entry is valid.
> (best)	The table entry is the best entry to use for that network.
i (internal)	The table entry was learned via an internal BGP session.

Origin codes

i (IGP)	Internal BGP
e (EGP)	External BGP
? (incomplete)	Protocol of unknown origin. Typically redistributed into BGP from an IGP.

applicable systems:

All models:

show ip bgp groups

This command provides information about BGP groups.

syntax:

```
show ip bgp groups [ < name > ]
```

example:

```
Alcatel-host> show ip bgp groups north
```

screen display example

```
> show ip bgp groups
  BGP group is AlcatelBgpExternal
    group type is External, total peers 1, established peers 0, members:
    192.202.2.2
    options set :
    None.
```

applicable systems:

All models:

show ip bgp neighbors

This command displays detailed information and status on all BGP neighbors, including:

- peer group and AS affiliations
- configured and negotiated timers
- minimum times between advertisements
- receive and transmit updates
- BGP state status
- TCP connection (active or inactive)

parameter	definition
group	Neighbors belonging to a group Enter a name or word.
address	Neighbor to display information about Enter an IP address.
routes	
advertised_routes	Display the routes advertised to a BGP neighbor.
received_routes	Display the routes received from a neighbor.

syntax:

```
show ip bgp neighbors [ group < name > ] [ address < IP address > ]
[ routes < advertised_routes | received_routes > ]
```

example:

```
Alcatel-host> show ip bgp neighbors
```

screen display example

```
> show ip bgp neighbors
BGP neighbor is 192.12.200.122, peer group is AlcatelBGPInternal
Remote AS 100, local AS 100, link Internal
BGP version 4, local router ID 192.168.50.50, remote router ID 10.150.100.1

Current state - Established, last state 0 OpenConfirm, last event =
RecvKeepAlive
Configured Hold time is 140 seconds, keepalive interval is 60 seconds
Active Holdtime is 100 seconds, keepalive interval is 60 seconds
Minimum time between advertisement runs is 90 milliseconds (default)
Received 12323 messages, 0 notifications, 0 updates
Sent 12333 messages, 0 notifications, 0 updates
Connections established 2
Local host: 192: 12.200.122, Local port 179
Foreign host: 10.12.200.122, Foreign port 2711
```

Table 11 Status and Origin Codes

Status codes	
* (valid)	The table entry is valid.
> (best)	The table entry is the best entry to use for that network.
i (internal)	The table entry was learned via an internal BGP session.
Origin codes	
i (IGP)	Internal BGP
e (EGP)	External BGP
? (incomplete)	Protocol of unknown origin.

Table 12 Other BGP show Descriptions

BGP neighbor	IP address of the BGP neighbor
peer group	Displays the name of the peer group.
remote AS	The remote AS number of the neighbor
local AS	The local AS number of the neighbor
link	Identifies the link as internal or external.
BGP version	Identifies the BGP version
local router ID	BGP identifier of the local router
remote router ID	BGP identifier of the remote router
current state	Current BGP protocol state
last state	Previous BGP protocol state
last event	Previous BGP protocol event
configured hold time	Configured BGP hold time
keepalive interval	Configured BGP keepalive interval
minimum time	Minimum time between advertisements
received	
messages	Number of received BGP messages
notifications	Number of received BGP notifications
updates	Number of received BGP updates
sent	
messages	Number of sent BGP messages
notifications	Number of sent BGP notifications
updates	Number of sent BGP updates
Maximum prefixes	The maximum number of prefixes that can be received from this neighbor.

applicable systems:

All models:

show ip bgp paths

This command shows all BGP paths in the database.

syntax:

show ip bgp paths

example:

Alcatel-host> **show ip bgp paths**

screen display example

```
> show ip bgp paths
Hash Refcount Path
32 2 ?
96 1 i
/configuration>
```

Table 13 Interpreting BGP Paths

term

hash	An area where path IP addresses are stored
refcount	The number of routes using a specific path
path	The AS path and origin for that route.

Table 14 Status and Origin Codes

Origin codes

i (IGP)	Internal BGP
e (EGP)	External BGP
? (incomplete)	Protocol of unknown origin.

applicable systems:

All models:

show ip bgp regexp

This command displays routes matching the regular expression.

parameter	definition
reg_exp	A regular expression to match the BGP AS paths. Strings must be enclosed by quotation marks.

syntax:

```
show ip bgp regexp reg_exp <"string">
```

example:

```
Alcatel-host> show ip bgp regexp ".* 600 .*"
```

applicable systems:

All models:

show ip bgp summary

This command shows the BGP router's identifying number, local AS number, and connected neighbors. Neighbor information includes BGP version (v), AS number, messages received and transmitted, and operating status.

syntax:

```
show ip bgp summary
```

example:

```
Alcatel-host> show ip bgp summary
```

screen display example

```
> show ip bgp summary

BGP router identifier 10.1.1.0, local AS member 200

Neighbor      V    AS    MsgRcvd   MsgSent   State
192.168.123.1  4    400     0         0        Active
172.10.16.1   4    200    59         59      Established

>
```

Table 15 Header Definitions

BGP router identifier	The local router ID, IP address
local AS number	The local AS number
V	BGP version spoken by a specific neighbor
AS	Autonomous system
msgRcvd	BGP messages received from a specific neighbor
msgSent	BGP messages sent by a specific neighbor
state	The state of all BGP sessions.

applicable systems:

All models:

show ip bgp table

This command shows entries in the BGP route table.

syntax:

show ip bgp table

example:

Alcatel-host> **show ip bgp table**

Table 16 Status and Origin Codes

Status codes

* (valid) The table entry is valid.

i (internal) The table entry was learned via an internal BGP session.

Origin codes

i (IGP) Internal BGP

e (EGP) External BGP

? (incomplete) Protocol of unknown origin.

applicable systems:

All models:

show policy

This command provides access to the following next-level policy display commands:

next-level commands

show policy as_path

show policy community_list

show policy ip_access_list

show policy route_map

show policy as_path

This command displays the AS path access lists.

parameter	definition
access_list	The access list number. The range is 1 - 199.

syntax:

```
show policy as_path [ access_list < n > ]
```

example:

```
Alcatel-host> show policy as_path
```

screen display example

```
> show policy as_path
AS path access list 1
  permit .* 699 .*
  permit .* 500
  deny 40 .*
AS path access list 2
  deny 60.*
>
```

related commands

```
show policy community_list
```

```
show policy ip_access_list
```

```
show policy route_map
```

applicable systems:

All models:

show policy community_list

This command shows configured community lists.

parameter	definition
community	The community list number. The range is 1 - 199.

syntax:

```
show policy community_list [ community < n > ]
```

example:

```
Alcatel-host> show policy community_list
```

related commands

show policy as_path

show policy ip_access_list

show policy route_map

applicable systems:

All models:

show policy ip_access_list

This command show routes that comply with specific IP access rules.

parameter	definition
number	IP access list number The range is 1 - 99.

syntax:

```
show policy ip_access_list [ number < n > ]
```

example:

```
Alcatel-host/show> policy ip_access_list
```

screen display example

```
> show policy ip_access_list
IP access list 1
  permit 10.0.0.0 255.255.255.255 0.255.255.255 255.255.255.255
  permit 20.0.0.0 255.255.255.255 255.255.255.255 255.255.255.255
IP access list 2
  permit 20.0.0.0 255.255.255.255 0.255.255.255 255.255.255.255
>
```

related commands

```
show policy as_path
```

```
show policy community_list
```

```
show policy route_map
```

applicable systems:

All models:

show policy route_map

This command shows route map information.

parameter	definition
name	The name of the route map.

syntax:

```
show policy route_map [ < name > ]
```

example:

```
Alcatel-host> show policy route_map
```

screen display example

```
> show policy route_map
route-map Block100, deny, sequence 1
  Batch clauses:
    as_path (as-path filter): 99
  Set clauses:
    origin bgp
>
```

related commands

show policy as_path

show policy community_list

show policy ip_access_list

applicable systems:

All models:

AS PATH REGULAR EXPRESSIONS

This appendix provides information about how to use and configure regular expressions for use with BGP4 routing protocol commands.

Matching AS Paths

An AS path regular expression is a regular expression with the alphabet used as the set of AS numbers defining a set of AS paths.

Note that according to this definition, AS path regular expressions are implicitly anchored at the beginning and end.

The following examples provide more information:

690	Matches only the specific AS path "690."
. *690 .*	Matches any AS path containing 690.
690 .*	Matches any AS path beginning with 690.
. *690	Matches any AS path ending in 690.

AS Path Regular Expressions (regex)

A regex is a character string containing one of the following:

term	Matches the given term.
regex1 regex2	Matches a path that is a concatenation of two paths, P1 and P2. P1 matches regex1 and P2 matches regex2. Note that spaces are ignored in general, but should be used between two concatenated ASs to distinguish them.
regex1 regex2	Matches a path that matches regex1 or regex2.

AS Path Terms

A term is one of the following:

AS	Matches the given number, which is any positive 16-bit number from 0-65535 inclusive. Note that valid AS numbers range from one through 65534 inclusive.
!AS	Matches any AS number except the given one.
AS1 -AS2	Is a range of ASs. It matches all AS numbers between AS1 and AS2 inclusive.
!AS1 - AS2	This matches all numbers except the given one.
.	Matches any number.
null	Matches an empty (0 length) string, e.g., (AS1 empty AS2) is equivalent to (AS1 AS2).
term {m, n}	A term followed by {m, n} (where m and n are both non-negative integers and m <= n) means at least m and at most n repetitions.
term {m}	A term followed by {m} (where m is a positive integer) matches m or more repetitions of term.
term {m,}	A term followed by {m,} (where m is a positive integer) matches m or more repetitions of term.
term *	A term followed by * matches zero or more repetitions of term. This is shorthand for {0,}.
term +	A term followed by + matches one or more repetitions of term. This is shorthand for {1,}.
term ?	A term followed by ? matches zero or one repetition of term. This is shorthand for {0,1}.
[as_range_list]	Brackets union the items of an as_range_list. An item of this list can be either an AS or a range. For example, {AS1 AS2 - AS3 AS4} is equivalent to (AS1 AS2-AS3 AS4).
(regex)	Parentheses group expressions to make a term out of any regex. An operator, such as * or ?, works on a regular expression enclosed in parentheses as it would any term.

OSPF CONFIGURE COMMANDS

Use OSPF **configure** commands to configure all OSPF routing parameters.

 **NOTE:** See the command **configure interface loopback** in the *Command Reference Guide: Domestic Products* for important information about loopback interfaces.

When configuring OSPF, keep the following in mind:

- n When you enable OSPF on bundles, make sure that both ends of the bundle are either “numbered” or “unnumbered.” If there is a mismatch, even though the adjacency will come up, route reachability issues may develop.
- n When the IP address is specified for a bundle and you later want to change the network *type* on that bundle to “broadcast,” you must also specify the type parameter for the bundle IP address. To do this, you must delete the bundle’s assigned IP address and reassign the IP address with the type broadcast parameter. For example:

```
Alcatel /configure/interface/bundle wan1> no ip address 2.2.2.2 24  
Alcatel/configure/interface/bundle wan1> ip address 2.2.2.2 24 type broadcast
```

- n Adjacencies will not form if hello_interval, dead_interval, or area_type mismatches are present.

configure router ospf

This command configures a router for OSPF routing.

syntax:

router ospf

example:

Alcatel-host/configure> **router ospf**

next-level commands

configure router ospf 1583Compatibility

configure router ospf area

configure router ospf distance

configure router ospf interface

configure router ospf redistribute

configure router ospf ref_bw

configure router ospf timers

applicable systems:

All models.

configure router ospf 1583Compatibility

This command establishes the route summary calculation method to be compatible with RFC 1583. The RFC compatibility of all routers in an OSPF domain should be configured the same. The default is 1583Compatibility disabled.

syntax:

1583Compatibility

example:

```
Alcatel-host/configure/router/ospf> 1583Compatibility
```

related commands

configure router ospf area

configure router ospf distance

configure router ospf interface

configure router ospf redistribute

configure router ospf ref_bw

configure router ospf timers

applicable systems:

All models.

configure router ospf area

This command configures an OSPF area.

parameter	definition
area_id	OSPF area id Enter either a decimal number or an IP address.

syntax:

area < area_id >

example:

Alcatel-host/configure/router/ospf> **area 0**

next-level commands

configure router ospf area area_type
configure router ospf area default_cost
configure router ospf area range
configure router ospf area virtual_link

related commands

configure router ospf 1583Compatibility
configure router ospf distance
configure router ospf interface
configure router ospf redistribute
configure router ospf ref_bw
configure router ospf timers

applicable systems:

All models.

configure router ospf area area_type

This command accesses the following next-level commands for configuring an area type.

next-level commands

configure router ospf area area_type normal

configure router ospf area area_type nssa

configure router ospf area area_type stub

related commands

configure router ospf area default_cost

configure router ospf area range

configure router ospf area virtual_link

applicable systems:

All models.

configure router ospf area area_type normal

This command specifies an area area type as normal.

syntax:

area_type normal

example:

Alcatel-host/configure/router/ospf/area 0> **area_type normal**

related commands

configure router ospf area area_type nssa

configure router ospf area area_type stub

applicable systems:

All models.

configure router ospf area area_type nssa

This command specifies an area type as (nssa) not-so-stubby area.

syntax:

area_type nssa

example:

Alcatel-host/configure/router/ospf/area 1> **area_type nssa**

next-level commands

configure router ospf area area_type nssa no_summary

related commands

configure router ospf area area_type normal

configure router ospf area area_type stub

applicable systems:

All models.

configure router ospf area area_type nssa no_summary

This command prevents an nssa area boundary router from sending summary link advertisements into an nssa area.

syntax:

no_summary

example:

Alcatel-host/configure/router/ospf/area 1/area_type/nssa> **no_summary**

applicable systems:

All models.

configure router ospf area area_type stub

This command configures an area as a stub area.

Stub areas are not flooded with AS external advertisements. Stub areas reduce the amount of memory required on stub area routers.

syntax:

[no] area_type stub

example:

Alcatel-host/configure/router/ospf/area 1> **area_type stub**

next-level commands

configure router ospf area area_type stub no_summary

related commands

configure router ospf area area_type normal

configure router ospf area area_type nssa

applicable systems:

All models.

configure router ospf area area_type stub no_summary

This command prevents an area boundary router from sending summary link advertisements into the stub area.

syntax:

no_summary

example:

Alcatel-host/configure/router/ospf/area 1/area_type/stub> **no_summary**

applicable systems:

All models.

configure router ospf area default_cost

This command specifies a cost for the default summary route sent into a stub area.

parameter	definition
default_cost	Enter a number. The range is 0 - 16777215; the default is 1.

syntax:

default_cost < n >

example:

```
Alcatel-host/configure/router/ospf/area 1> default_cost 10
```

related commands

configure router ospf area area_type

configure router ospf area range

configure router ospf area virtual_link

applicable systems:

All models.

configure router ospf area range

This command summarizes routes at the area boundaries, producing a single route that is advertised by area border routers.

parameter	definition
networknumber	IP address
mask	netmask
advertise_enum	
advertise	Advertise this range.
not_advertise	Do not advertise this range.

syntax:

```
[ no ] range networknumber < IP address > mask < netmask >  
[ advertise_enum < advertise | not_advertise > ]
```

example:

```
Alcatel-host/configure/router/ospf/area 0> range 100.1.0.0 255.255.0.0 advertise
```

related commands

configure router ospf area_type

configure router ospf area default_cost

configure router ospf area area virtual_link

applicable systems:

All models.

configure router ospf area virtual_link

This command defines an OSPF virtual link for an area.

Establishes a virtual connection to the backbone for an area border router that is not physically connected to the backbone. A virtual link requires that each virtual link neighbor must include the transit area ID and the virtual link neighbor's router ID.

parameter	definition
virtual_link	IP address for the virtual link. Enter an IP address.

syntax:

```
[ no ] virtual_link < IP address >
```

example:

```
Alcatel-host/configure/router/ospf/area 1> virtual_link 100.10.1.5
```

next-level commands

```
configure router ospf area virtual_link authentication
```

```
configure router ospf area virtual_link dead_interval
```

```
configure router ospf area virtual_link hello_interval
```

```
configure router ospf area virtual_link retransmit_interval
```

```
configure router ospf area virtual_link transmit_delay
```

applicable systems:

All models.

configure router ospf area virtual_link authentication

This command configures authentication for an area virtual link.

Authentication guarantees that only trusted routers send and receive traffic within an area. Each interface must use the same type of authentication.

parameter	definition
authentication type	
simple	Uses a text password that is imbedded in the packet.
md5	Creates an encoded checksum that is imbedded in the packet.
md5_cisco	Cisco compatible MD5 authentication
line	A 16-character (maximum) password string beginning with an alpha character.

syntax:

authentication < none | simple | md5 | md5_cisco > < line >

example:

Alcatel-host/configure/router/ospf/area 1/virtual_link 100.10.1.5> **authentication simple** Alcatel

related commands

configure router ospf area virtual_link dead_interval

configure router ospf area virtual_link hello_interval

configure router ospf area virtual_link retransmit_interval

configure router ospf area virtual_link transmit_delay

applicable systems:

All models.

configure router ospf area virtual_link dead_interval

This command sets the time, in seconds that an OSPF neighbor will wait for a hello packet.

Once the user-defined time expires, the interface assumes that the neighbor is down. The value entered should be approximately four times the value of the hello_interval.

parameter	definition
dead_interval	<p>The time in seconds.</p> <p>The value configured must be the same for all routers and servers in the same network.</p> <p>The range is 1 - 65535; the default value is 40.</p> <p>The recommended value to configure is four times the value configured for the hello interval.</p>

syntax:

[no] dead_interval < n >

example:

Alcatel-host/configure/router/ospf/area 1/virtual_link 100.10.1.5> **dead_interval 10**

related commands

configure router ospf area virtual_link authentication

configure router ospf area virtual_link hello_interval

configure router ospf area virtual_link retransmit_interval

configure router ospf area virtual_link transmit_delay

applicable systems:

All models.

configure router ospf area virtual_link hello_interval

This command configures the time interval between transmission of hello packets.

parameter	definition
hello_interval	The time in seconds. The value configured must be the same for all routers and servers in the same network. The range is 1 - 65535; the default is 10 seconds.

syntax:

[no] hello_interval < n >

example:

Alcatel-host/configure/router/ospf/area 1/virtual_link 100.10.1.5> **hello_interval 10**

related commands

configure router ospf area virtual_link authentication

configure router ospf area virtual_link dead_interval

configure router ospf area virtual_link retransmit_interval

configure router ospf area virtual_link transmit_delay

applicable systems:

All models.

configure router ospf area virtual_link retransmit_interval

This command configures the time between link state advertisement retransmissions on an interface.

parameter	definition
retransmit_interval	The time in seconds. The configured value must be greater than the expected round-trip delay. The range is 1 - 65535; the default is 5.

syntax:

[no] retransmit_interval < n >

example:

Alcatel-host/configure/router/ospf/area 1/virtual_link 100.10.1.5> **retransmit_interval 5**

related commands

configure router ospf area virtual_link authentication

configure router ospf area virtual_link dead_interval

configure router ospf area virtual_link hello_interval

configure router ospf area virtual_link transmit_delay

applicable systems:

All models.

configure router ospf area virtual_link transmit_delay

This command configures the estimated time to transmit a link state update packet on an interface.

parameter	definition
transmit_delay	The time in seconds. Link state advertisements in the update packet are aged by this amount prior to transmission. The range is 1 - 65535; the default is 1. The value must be greater than zero.

syntax:

[no] transmit_delay < n >

example:

Alcatel-host/configure/router/ospf/area 1/virtual_link 100.10.1.5> **transmit_delay 1**

related commands

configure router ospf area virtual_link authentication

configure router ospf area virtual_link dead_interval

configure router ospf area virtual_link hello_interval

configure router ospf area virtual_link retransmit_interval

applicable systems:

All models.

configure router ospf distance

This command accesses the following next-level commands to configure OSPF administrative distances for routes.

next-level commands

configure router ospf distance ospf

related commands

configure router ospf 1583 *Compatability*

configure router ospf area

configure router ospf interface

configure router ospf redistribute

configure router ospf ref_bw

configure router ospf timers

applicable systems:

All models.

configure router ospf distance ospf

This command accesses next-level commands that configure OSPF administrative distances based on route type.

next-level commands

configure router ospf distance ospf external

configure router ospf distance ospf non_external

applicable systems:

All models.

configure router ospf distance ospf external

This command configures the distance parameter for external routes.

parameter	definition
external	Type-5 and type-7 external routes The range is 1 - 255; the default is 150.

syntax:

```
[ no ] distance ospf external < n >
```

example:

```
Alcatel-host/configure/router/ospf> distance ospf external 25
```

Table 17 Default Route Preference (Administrative Distance) Values

How Route is Learned	Default Preference	Command to Modify Default Preference
Directly connected network	0	Not configurable.
Static	1	Not configurable.
OSPF non-external route	10	configure router ospf distance ospf non_external
RIP	100	configure router rip distance
Generated or aggregate	130	Applicable to BGP only, and is not configurable.
OSPF AS external routes	150	configure router ospf distance ospf external
BGP	170	configure router bgp distance

related commands

```
configure router ospf distance ospf non_external
```

applicable systems:

All models.

configure router ospf distance ospf non_external

This command configures the distance parameter for inter- and intra-area routes.

parameter	definition
non_external	Inter-area and intra-area routes The range is 1 - 255; the default is 10.

syntax:

```
[ no ] distance ospf non_external < n >
```

example:

```
Alcatel-host/configure/router/ospf> distance ospf non_external 25
```

Table 18 Default Route Preference (Administrative Distance) Values

How Route is Learned	Default Preference	Command to Modify Default Preference
Directly connected network	0	Not configurable.
Static	1	Not configurable.
OSPF non-external route	10	configure router ospf distance ospf non_external
RIP	100	configure router rip distance
Generated or aggregate	130	Applicable to BGP only, and is not configurable.
OSPF AS external routes	150	configure router ospf distance ospf external
BGP	170	configure router bgp distance

related commands

```
configure router ospf distance ospf external
```

applicable systems:

All models.

configure router ospf interface

This command configures an interface for OSPF routing.

parameter	definition
name	Enter an interface name, such as ethernet0, ethernet1, or a bundle name.
dlci	Data link connection identifier of the pvc (for frame relay use). The range is 16 - 1022; there is no default.
area_id	OSPF area ID Enter either a decimal number or an IP address.

syntax:

```
[ no ] interface < name > [ dlci < n > ] [ < area _id > ]
```



NOTE: When the “ospf” interface is created for the first time, area id must be specified. Thereafter, it is optional.

example:

```
Alcatel-host/configure/router/ospf> interface Toronto 5
```

next-level commands

```
configure router ospf interface authentication
```

```
configure router ospf interface cost
```

```
configure router ospf interface dead_interval
```

```
configure router ospf interface hello_interval
```

```
configure router ospf interface neighbor
```

```
configure router ospf interface network
```

```
configure router ospf interface poll_interval
```

```
configure router ospf interface priority
```

```
configure router ospf interface retransmit_interval
```

```
configure router ospf interface transmit_delay
```

related commands

configure router ospf 1583Compatibility

configure router ospf area

configure router ospf distance

configure router ospf redistribute

configure router ospf ref_bw

configure router ospf timers

applicable systems:

All models.

configure router ospf interface authentication

This command configures the authentication type on an interface.

parameter	definition
authentication type	
simple	Simple password authentication
md5	MD5 authentication
md5_cisco	Cisco compatible md5 authentication
line	A 16-character (maximum) password string beginning with an alpha character.

syntax:

[no] authentication < type > < line >

example:

```
Alcatel-host/configure/router/ospf/interface toBoston> authentication md5 Alcatel
```

related commands

configure router ospf interface cost

configure router ospf interface dead_interval

configure router ospf interface hello_interval

configure router ospf interface neighbor

configure router ospf interface network

configure router ospf interface poll_interval

configure router ospf interface priority

configure router ospf interface retransmit_interval

configure router ospf interface transmit_delay

applicable systems:

All models.

configure router ospf interface cost

This command configures the OSPF metric cost for a specific interface.

parameter	definition
cost	Metric cost of sending packets on a particular OSPF interface. The range is 1 - 65535; the default is computed based on the interface bandwidth.

syntax:

```
[ no ] cost < n >
```

example:

```
Alcatel-host/configure/router/ospf/interface toBoston> cost 10
```

related commands

configure router ospf interface authentication

configure router ospf interface dead_interval

configure router ospf interface hello_interval

configure router ospf interface neighbor

configure router ospf interface network

configure router ospf interface poll_interval

configure router ospf interface priority

configure router ospf interface retransmit_interval

configure router ospf interface transmit_delay

applicable systems:

All models.

configure router ospf interface dead_interval

This command sets the time, in seconds, that an OSPF neighbor will wait for a hello packet. Once the user-defined time expires, the interface assumes that the neighbor is down. The value entered should be approximately four times the value of the hello_interval.

parameter	definition
dead_interval	Time, in seconds The range is 1- 65535; the default is 40.

syntax:

[no] dead_interval < n >

example:

```
Alcatel-host/configure/router/ospf/interface> dead_interval 50
```

related commands

configure router ospf interface authentication

configure router ospf interface cost

configure router ospf interface hello_interval

configure router ospf interface neighbor

configure router ospf interface network

configure router ospf interface poll_interval

configure router ospf interface priority

configure router ospf interface retransmit_interval

configure router ospf interface transmit_delay

applicable systems:

All models.

configure router ospf interface hello_interval

This command sets the time interval, in seconds, between the hello packets that are sent on the interface.

parameter	definition
hello_interval	Time in seconds The default is 10; the range is 1 - 65535.

syntax:

[no] hello_interval < n >

example:

Alcatel-host/configure/router/ospf/interface toBoston> **hello_interval 30**

related commands

configure router ospf interface authentication
configure router ospf interface cost
configure router ospf interface dead_interval
configure router ospf interface neighbor
configure router ospf interface network
configure router ospf interface poll_interval
configure router ospf interface priority
configure router ospf interface retransmit_interval
configure router ospf interface transmit_delay

applicable systems:

All models.

configure router ospf interface neighbor

This command sets up an OSPF neighbor router for an interface that is used on a non-broadcast network.

parameter	definition
ip address	The IP address of the neighbor router
priority	Sets the router priority for a non-broadcast neighbor. The range is 0 - 255; the default is 1.

syntax:

[no] neighbor < *IP address* > [priority < n >]

example:

Alcatel-host/configure/router/ospf/interface toBoston> **neighbor 100.22.12.2 7**

related commands

configure router ospf interface authentication

configure router ospf interface cost

configure router ospf interface dead_interval

configure router ospf interface hello_interval

configure router ospf interface network

configure router ospf interface poll_interval

configure router ospf interface priority

configure router ospf interface retransmit_interval

configure router ospf interface transmit_delay

applicable systems:

All models.

configure router ospf interface network

This command configures the OSPF network type on an interface.

interface type	network type default
PPP/HDLC	point-to-point
Ethernet	broadcast
Frame Relay	point-to-point

parameter	definition
network type	
broadcast	Configures network type to broadcast multi-access network
non_broadcast	Configures network type to nonbroadcast multiaccess (NBMA) network
point_to_multipoint	Configures network type to point-to-multipoint network
point_to_point	Configures network type to point-to-point network

syntax:

```
[ no ] network < broadcast | non_broadcast | point_to_multipoint | point_to_point >
```



NOTE: If the interface type is point-to-point, then to change the network type to broadcast, the user must first change the point-to-point interface to broadcast type using the **ip address** command.



NOTE: The “non_broadcast” and “point_to_multipoint” parameters are not supported in this release.

example:

```
Alcatel-host/configure/router/ospf/interface toBoston> network non_broadcast
```

related commands

configure router ospf interface authentication

configure router ospf interface cost

configure router ospf interface dead_interval

configure router ospf interface hello_interval

configure router ospf interface neighbor

configure router ospf interface poll_interval

configure router ospf interface priority

configure router ospf interface retransmit_interval

configure router ospf interface transmit_delay

applicable systems:

All models.

configure router ospf interface poll_interval

This command, used for nonbroadcast interfaces only, specifies how often the router sends hello packets from the interface before establishing adjacency with a neighbor.

parameter	definition
poll_interval	The time, in seconds The range is 0 - 2147483647; the default is 120.

syntax:

[no] poll_interval < n >

example:

```
Alcatel-host/configure/router/ospf/interface toBoston> poll_interval 15
```

related commands

configure router ospf interface authentication

configure router ospf interface cost

configure router ospf interface dead_interval

configure router ospf interface hello_interval

configure router ospf interface neighbor

configure router ospf interface network

configure router ospf interface priority

configure router ospf interface retransmit_interval

configure router ospf interface transmit_delay

applicable systems:

All models.

configure router ospf interface priority

This command configures the priority (which is used in the election of designated routes) to establish the designated router.

parameter	definition
priority	Number that specifies the router priority. This is only used in non point-to-point networks. The range is 0 - 255; the default is 1.

syntax:

```
[ no ] priority < n >
```

example:

```
Alcatel-host/configure/router/ospf/interface toBoston> priority 5
```

related commands

```
configure router ospf interface authentication  
configure router ospf interface cost  
configure router ospf interface dead_interval  
configure router ospf interface hello_interval  
configure router ospf interface neighbor  
configure router ospf interface network  
configure router ospf interface poll_interval  
configure router ospf interface retransmit_interval  
configure router ospf interface transmit_delay
```

applicable systems:

All models.

configure router ospf interface retransmit_interval

This command configures the retransmit time for the link state advertisement retransmission for neighbors belonging to the interface.

When a router sends a link state advertisement to its neighbor, it keeps the LSA until it receives an acknowledgment. If an acknowledgment is not received in n seconds, the router will retransmit the LSA.

parameter	definition
seconds	Time in seconds between retransmission. It must be conservatively set, but greater than the expected round trip delay between routers on the attached network. The range is 1- 65535; the default is 5.

syntax:

```
[ no ] retransmit_interval < n >
```

example:

```
Alcatel-host/configure/router/ospf/interface toBoston> retransmit_interval 60
```

related commands

```
configure router ospf interface authentication
configure router ospf interface cost
configure router ospf interface dead_interval
configure router ospf interface hello_interval
configure router ospf interface neighbor
configure router ospf interface network
configure router ospf interface poll_interval
configure router ospf interface priority
configure router ospf interface transmit_delay
```

applicable systems:

All models.

configure router ospf interface transmit_delay

This command configures the approximate time it takes to transmit a link state advertisement update packet on the interface.

parameter	definition
seconds	Time in seconds. Usage of this command is most appropriate for low speed links. The range is 1- 65535; the default is 1.

syntax:

[no] transmit_delay < n >

example:

```
Alcatel-host/router/ospf/interface toBoston> transmit_delay 3
```

related commands

configure router ospf interface authentication
configure router ospf interface cost
configure router ospf interface dead_interval
configure router ospf interface hello_interval
configure router ospf interface neighbor
configure router ospf interface network
configure router ospf interface poll_interval
configure router ospf interface priority
configure router ospf interface retransmit_interval

applicable systems:

All models.

configure router ospf redistribute

This command accesses next-level commands that are used to redistribute routes from other routers or routing protocols.

syntax:

redistribute

example:

Alcatel-host/configure/router/ospf> **redistribute**

next-level commands

configure router ospf redistribute bgp

configure router ospf redistribute connected

configure router ospf redistribute rip

configure router ospf redistribute static

related commands

configure router ospf 1583Compatability

configure router ospf area

configure router ospf distance

configure router ospf interface

configure router ospf ref_bw

configure router ospf timers

applicable systems:

All models.

configure router ospf redistribute bgp

This command redistributes BGP routes.

parameter	definition
as_number	Autonomous system number The range is 1 - 65535.
metric	OSPF default metric The range is 0 - 16777214; the default is 100.
metric_type	Ospf exterior metric type for redistribution The range is 1 - 2; the default is 2.
route_map	Pointer (name or word) to route map entries
tag	32-bit tag value The range is 0 - 2147483647; the default is 0.

 **NOTE:** See the Policy commands chapter, specifically “configure policy route_map” on page 23 for more information about configuring route maps.

syntax:

```
redistribute bgp as_number < n > [ metric < n > ] [ < metric_type < n > ] [ route_map  
< name > ] [ tag < n > ]
```

example:

```
Alcatel-host/configure/router/ospf> redistribute bgp as_number 10
```

related commands

configure router ospf redistribute connected

configure router ospf redistribute rip

configure router ospf redistribute static

applicable systems:

All models.

configure router ospf redistribute connected

This command redistributes connected interface routes.

parameter	definition
metric	OSPF default metric The range is 0 - 16777214; the default is 100.
metric_type	Ospf exterior metric type for redistribution The range is 1 - 2; the default is 2.
route_map	Pointer (name or word) to route map entries
tag	32-bit tag value The range is 0 - 2147483647; the default is 0.



NOTE: See policy commands, specifically “configure policy route_map” on page 23 for more information about configuring route maps.

syntax:

```
redistribute connected [ metric < n > ] [ < metric_type < n > ] [ route_map < name > ]
[ tag < n > ]
```

example:

```
Alcatel-host/configure/router/ospf> redistribute connected
```

related commands

configure router ospf redistribute bgp

configure router ospf redistribute rip

configure router ospf redistribute static

applicable systems:

All models.

configure router ospf redistribute rip

This command redistributes RIP routes.

parameter	definition
metric	OSPF default metric The range is 0 - 16777214; the default is 100.
metric_type	Ospf exterior metric type for redistribution The range is 1 - 2; the default is 2.
route_map	Pointer (name or word) to route map entries
tag	32-bit tag value The range is 0 - 2147483647; the default is 0.



NOTE: See policy commands, specifically “configure policy route_map” on page 23 for more information about configuring route maps.

syntax:

redistribute rip [metric < n >] [< metric_type < n >] [route_map < name >] [tag < n >]

example:

```
Alcatel-host/configure/router/ospf> redistribute rip
```

related commands

configure router ospf redistribute bgp

configure router ospf redistribute connected

configure router ospf redistribute static

applicable systems:

All models.

configure router ospf redistribute static

This command redistributes static routes.

parameter	definition
metric	OSPF default metric The range is 1 - 16777214; the default is 100.
metric_type	Ospf exterior metric type for redistribution The range is 1 - 2; the default is 2.
route_map	Pointer (name or word) to route map entries
tag	32-bit tag value The range is 0 - 2147483647; the default is 0.



NOTE: See policy commands, specifically “configure policy route_map” on page 23 for more information about configuring route maps.

syntax:

```
redistribute static [ metric < n > ] [ < metric_type < n > ] [ route_map < name > ]  
[ tag < n > ]
```

example:

```
Alcatel-host/configure/router/ospf> redistribute static
```

related commands

configure router ospf redistribute bgp

configure router ospf redistribute connected

configure router ospf redistribute static

applicable systems:

All models.

configure router ospf ref_bw

This command calculates OSPF interface cost according to bandwidth usage.
Specifying a large number helps differentiate cost on multiple high bandwidth links.

parameter	definition
reference_bandwidth	Reference bandwidth in Mbps The range is 1 - 4294967.

syntax:

ref_bw < n >

example:

Alcatel-host/configure/router/ospf> **ref_bw 100000**

related commands

configure router ospf 1583Compatibility

configure router ospf area

configure router ospf distance

configure router ospf interface

configure router ospf redistribute

configure router ospf timers

applicable systems:

All models.

configure router ospf timers

This command configures and adjusts ospf spf timers.

parameter	definition
timers	
spf_delay	Delay between receiving a change to the SPF calculation. The range is 1 - 65535; the default is 5.
spf_holdtime	The hold time between consecutive SPF calculations. The range is 1 - 65535; the default is 10.

syntax:

timers [spf_delay < n > | spf_holdtime < n >]

example:

```
Alcatel-host/configure/router/ospf> timers spf_delay 20
```

related commands

configure router ospf 1583Compatibility

configure router ospf area

configure router ospf distance

configure router ospf interface

configure router ospf redistribute

configure router ospf ref_bw

applicable systems:

All models.

OSPF SHOW COMMANDS

Use OSPF display/show commands to display all configured OSPF information.

show ip ospf area

This command displays configuration information about an OSPF area.

parameter	definition
area_id	OSPF area ID Enter either a decimal number or an IP address.

syntax:

```
area [ area_id ]
```

example:

```
Alcatel-host> show ip ospf area 1
```

screen display example

```
> show ip ospf area_id 1

Area 1
  Number of interfaces in this area is 0
  Area type is NORM
  SPF algorithm executed 1 times
  No area ranges defined

>
```

related commands

```
show ip ospf global
```

```
show ip ospf database
```

```
show ip ospf interface
```

```
show ip ospf neighbor
```

```
show ip ospf retransmission_list
```

```
show ip ospf request_list
```

```
show ip ospf virtual_links
```

applicable systems:

All models.

show ip ospf database

This command provides access to commands that display information about an OSPF database.

syntax:
database

example:
Alcatel-host> **show ip ospf database**

next-level commands

show ip ospf database all
show ip ospf database asbr_summary
show ip ospf database database_summary
show ip ospf database external
show ip ospf database network
show ip ospf database nssa_external
show ip ospf database router
show ip ospf database self_originate
show ip ospf database summary

related commands

show ip ospf area
show ip ospf global
show ip ospf interface
show ip ospf neighbor
show ip ospf retransmission_list
show ip ospf request_list
show ip ospf virtual_links

applicable systems:
All models.

show ip ospf database all

This command displays information related to the OSPF databases of the router.

parameter	definition
area_id	OSPF area ID Enter either a decimal number or an IP address.
adv_t_rtr	OSPF advertisement router Enter an IP address.
link_id	OSPF link state ID Enter an IP address.

syntax:

```
show ip ospf database all [ area_id < n > ] [ adv_t_rtr < IP address > ]
[ link_id < IP address > ]
```

example:

```
Alcatel-host> show ip ospf database all
```

screen display example

```
> show ip ospf database all
Router LSAs for Area 0
LinkState ID   Adv Router   Age   Seq>   Checksum   Link Count
10.1.1.1      10.1.1.1    701   0x80000001  0x6cdc     0
>
```

next-level commands

show ip ospf database asbr_summary

show ip ospf database database_summary

show ip ospf database external

show ip ospf database network

show ip ospf database nssa_external

show ip ospf database router

show ip ospf database self_originate

show ip ospf database summary

applicable systems:

All models.

show ip ospf database asbr_summary

This command displays information about ASBR summary link states.

parameter	definition
area_id	OSPF area ID Enter either a decimal number or an IP address.
advr_rtr	OSPF advertisement router Enter an IP address.
link_id	OSPF link state ID Enter an IP address.

syntax:

```
database asbr_summary [ area_id < decimal form or IP address > ] [ advr_rtr < IP address > ]  
[ link_id < IP address > ]
```

example:

```
Alcatel-host> show ip ospf database asbr_summary
```

next-level commands

show ip ospf database all

show ip ospf database database_summary

show ip ospf database external

show ip ospf database network

show ip ospf database nssa_external

show ip ospf database router

show ip ospf database self_originate

show ip ospf database summary

applicable systems:

All models.

show ip ospf database database_summary

This command displays OSPF database summary information.

syntax:

database database_summary

example:

Alcatel-host> **show ip ospf database database_summary**

screen display example

```
> show ip ospf database database_summary
Area ID      Router  Network Sum-Net Sum-ASBR NSSA  Subtotal Deleted Maxaged
-----
0            1       0       0       0       0       1       0       0
AS External
Total       1       0       0       0       0       1
>
```

next-level commands

show ip ospf database all

show ip ospf database asbr_summary

show ip ospf database external

show ip ospf database network

show ip ospf database nssa_external

show ip ospf database router

show ip ospf database self_originate

show ip ospf database summary

applicable systems:

All models.

show ip ospf database external

This command displays information about external LSAs in the OSPF database.

parameter	definition
area_id	OSPF area ID Enter either a decimal number or an IP address.
advt_rtr	OSPF advertisement router Enter an IP address.
link_id	OSPF link state ID Enter an IP address.

syntax:

```
database external [area_id < decimal form or IP address > ] [ advt_rtr < IP address > ]  
[ link_id < IP address > ]
```

example:

```
Alcatel-host> show ip ospf database external
```

next-level commands

show ip ospf database all

show ip ospf database asbr_summary

show ip ospf database database_summary

show ip ospf database network

show ip ospf database nssa_external

show ip ospf database router

show ip ospf database self_originate

show ip ospf database summary

applicable systems:

All models.

show ip ospf database network

This command displays database information about the network LSAs.

parameter	definition
area_id	OSPF area ID Enter either a decimal number or an IP address.
advt_rtr	OSPF advertisement router Enter an IP address.
link_id	OSPF link state ID Enter an IP address.

syntax:

```
database network [area_id < decimal form or IP address > ] [ advt_rtr < IP address > ]  
[ link_id < IP address > ]
```

example:

```
Alcatel-host> show ip ospf database network
```

next-level commands

show ip ospf database all

show ip ospf database asbr_summary

show ip ospf database database_summary

show ip ospf database external

show ip ospf database nssa_external

show ip ospf database router

show ip ospf database self_originate

show ip ospf database summary

applicable systems:

All models.

show ip ospf database nssa_external

This command shows OSPF database information about nssa external LSAs.

parameter	definition
area_id	OSPF area ID Enter either a decimal number or an IP address.
advt_rtr	OSPF advertisement router Enter an IP address.
link_id	OSPF link state ID Enter an IP address.

syntax:

```
database nssa_external [area_id < decimal value or IP address > ] [ advt_rtr < IP address > ]  
[ link_id < IP address > ]
```

example:

```
Alcatel-host> show ip ospf database nssa_external
```

next-level commands

show ip ospf database all

show ip ospf database asbr_summary

show ip ospf database database_summary

show ip ospf database external

show ip ospf database network

show ip ospf database router

show ip ospf database self_originate

show ip ospf database summary

applicable systems:

All models.

show ip ospf database router

This command shows information about router LSAs in the OSPF database.

parameter	definition
area_id	OSPF area ID Enter either a decimal number or an IP address.
advr_rtr	OSPF advertisement router Enter an IP address.
link_id	OSPF link state ID Enter an IP address.

syntax:

```
database router [area_id < decimal form or IP address > ] [ advr_rtr < IP address > ]
[ link_id < IP address > ]
```

example:

```
Alcatel-host> show ip ospf database router
```

screen display example

```
> show ip ospf database router
      Router LSAs for Area 0

LS age: 1743
LS Options: ( E )
Link State ID: 10.1.1.1
Advertising Router: 10.1.1.1
LS Sequence>: 0x80000001
LS Checksum: 0x6cdc
Length: 24
  Number of Links: 0

>
```

next-level commands

show ip ospf database all

show ip ospf database asbr_summary

show ip ospf database database_summary

show ip ospf database external

show ip ospf database network

show ip ospf database nssa_external

show ip ospf database self_originate

show ip ospf database summary

applicable systems:

All models.

show ip ospf database self_originate

This command displays OSPF database information about self-originated LSAs in the router.

parameter	definition
area_id	OSPF area ID Enter either a decimal number or an IP address.

syntax:

database self_originate [area_id < n >]

example:

Alcatel-host> **show ip ospf database self_originate**

screen display example

```
> show ip ospf database self_originate
Router LSAs for Area 0
LinkState ID    Adv Router      Age  Seq#    Checksum  Link Count
10.1.1.1.1     10.1.1.1       9   0x80000002  0x6add    0
>
```

next-level commands

show ip ospf database all

show ip ospf database asbr_summary

show ip ospf database database_summary

show ip ospf database external

show ip ospf database network

show ip ospf database nssa_external

show ip ospf database router

show ip ospf database summary

applicable systems:

All models.

show ip ospf database summary

This command displays information about summary LSAs in the OSPF database.

parameter	definition
area_id	OSPF area ID Enter either a decimal number or an IP address.
advt_rtr	OSPF advertisement router Enter an IP address.
link_id	OSPF link state ID Enter an IP address.

syntax:

```
database summary [area_id < decimal form or IP address > ] [ advt_rtr < IP address > ]  
[ link_id < IP address > ]
```

example:

```
Alcatel-host> show ip ospf database summary
```

next-level commands

show ip ospf database all

show ip ospf database asbr_summary

show ip ospf database database_summary

show ip ospf database external

show ip ospf database network

show ip ospf database nssa_external

show ip ospf database router

show ip ospf database self_originate

applicable systems:

All models.

show ip ospf global

This command displays global OSPF information.

syntax:

global

example:

Alcatel-host> **show ip ospf global**

screen display example

```
> show ip ospf global

Routing Process 'ospf 30583' with ID 10.1.1.1
It is rfc1583 incompatible
Summary Link update interval is 1800
SPF schedule delay 5 secs, Hold time between two SPFs 10 secs
Reference bandwidth 100 Megabits per second
Number of areas in this router is 1. 1 normal 0 stub 0 nssa
Area 0
  Number of interfaces in this area is 0
  Area type is NORM
  SPF algorithm executed 1 times
  No area ranges defined

>
```

related commands

show ip ospf area

show ip ospf database

show ip ospf interface

show ip ospf neighbor

show ip ospf retransmission_list

show ip ospf request_list

show ip ospf virtual_links

applicable systems:

All models.

show ip ospf interface

This command provides access to commands that display information about configured OSPF interfaces.

syntax:
interface

example:
Alcatel-host> **show ip ospf interface**

next-level commands

show ip ospf interface all
show ip ospf interface bundle
show ip ospf interface ethernet

related commands

show ip ospf area
show ip ospf global
show ip ospf database
show ip ospf neighbor
show ip ospf retransmission_list
show ip ospf request_list
show ip ospf virtual_links

applicable systems:
All models.

show ip ospf interface all

This command displays configuration information about all configured OSPF interfaces.

syntax:

interface all

example:

Alcatel-host> **show ip ospf interface all**

related commands

show ip ospf interface bundle

show ip ospf interface ethernet

applicable systems:

All models.

show ip ospf interface bundle

This command displays configuration information about an OSPF bundle.

syntax:

```
interface bundle < name > [ pvc < n > ]
```

example:

```
Alcatel-host> show ip ospf interface bundle Boise
```

related commands

show ip ospf interface all

show ip ospf interface ethernet

applicable systems:

All models.

show ip ospf interface ethernet

This command displays OSPF configuration information about an Ethernet interface.

syntax:

interface ethernet < n >

example:

Alcatel-host> **show ip ospf interface ethernet 1**

related commands

show ip ospf interface all

show ip ospf interface bundle

applicable systems:

All models.

show ip ospf neighbor

This command provides access to next-level commands that display configuration information about OSPF neighbors.

syntax:
neighbor

example:
Alcatel-host> **show ip ospf neighbor**

next-level commands

show ip ospf neighbor detail
show ip ospf neighbor id
show ip ospf neighbor interface
show ip ospf neighbor list

related commands

show ip ospf area
show ip ospf global
show ip ospf database
show ip ospf interface
show ip ospf retransmission_list
show ip ospf request_list
show ip ospf virtual_links

applicable systems:
All models.

show ip ospf neighbor detail

This command displays detailed OSPF configuration information about all neighbors.

syntax:
neighbor detail

example:
Alcatel-host> **show ip ospf neighbor detail**

related commands

show ip ospf neighbor id

show ip ospf neighbor interface

show ip ospf neighbor list

applicable systems:
All models.

show ip ospf neighbor id

This command displays OSPF configuration information about a specific neighbor.

syntax:

neighbor id < *IP address* >

example:

Alcatel-host> **show ip ospf neighbor id 10.3.1.2**

related commands

show ip ospf neighbor detail

show ip ospf neighbor interface

show ip ospf neighbor list

applicable systems:

All models.

show ip ospf neighbor interface

This command provides access to commands that display OSPF configuration information about all neighbors in an interface.

syntax:

neighbor interface ethernet < n > | bundle < name > [pvc < n >]

example:

Alcatel-host> **show ip ospf neighbor interface ethernet 1**

next-level commands

show ip ospf neighbor interface bundle

show ip ospf neighbor interface ethernet

applicable systems:

All models.

show ip ospf neighbor interface bundle

This command displays information about an OSPF neighbors on a bundle interface.

syntax:

```
neighbor interface bundle < name > [ pvc < n > ]
```

example:

```
Alcatel-host> show ip ospf neighbor interface bundle Boise
```

related commands

```
show ip ospf neighbor interface ethernet
```

applicable systems:

All models.

show ip ospf neighbor interface ethernet

This command displays configuration information about a neighbor on an Ethernet interface.

syntax:

neighbor interface ethernet < n >

example:

Alcatel-host> **show ip ospf neighbor interface ethernet 1**

related commands

show ip ospf neighbor interface bundle

applicable systems:

All models.

show ip ospf neighbor list

This command displays a list of neighbors attached to this router.

syntax:
neighbor list

example:
Alcatel-host> **show ip ospf neighbor list**

related commands

show ip ospf neighbor detail
show ip ospf neighbor id
show ip ospf neighbor interface

applicable systems:
All models.

show ip ospf request_list

This command displays the LSAs in the request list of the specified neighbor.

syntax:

request_list < *IP address* >

example:

Alcatel-host> **show ip ospf request_list 10.10.10.1**

related commands

show ip ospf area

show ip ospf global

show ip ospf database

show ip ospf interface

show ip ospf neighbor

show ip ospf retransmission_list

show ip ospf virtual_links

applicable systems:

All models.

show ip ospf retransmission_list

This command displays the LSAs in the retransmission list of the specified neighbor.

syntax:

retransmission_list < *IP address* >

example:

Alcatel-host> **show ip ospf retransmission_list 10.10.10.1**

related commands

show ip ospf area

show ip ospf database

show ip ospf g;pba;

show ip ospf interface

show ip ospf neighbor

show ip ospf request_list

show ip ospf virtual_links

applicable systems:

All models.

show ip ospf virtual_links

This command displays information about configured OSPF virtual links.

syntax:

virtual_links [< *IP address* >]

example:

Alcatel-host> **show ip ospf virtual_links**

related commands

show ip ospf area

show ip ospf global

show ip ospf database

show ip ospf interface

show ip ospf neighbor

show ip ospf retransmission_list

show ip ospf request_list

applicable systems:

All models.

RIP CONFIGURE COMMANDS

Use RIP configure commands to configure all RIP parameters.

 **NOTE:** See the command **configure interface loopback** in the *Command Reference Guide: Domestic Products* for important information about loopback interfaces.

configure router rip

This command enables the Routing Information Protocol (RIP).

syntax:

[no] router rip

example:

Alcatel-host/configure> **router rip**

next-level commands

configure router rip default_metric

configure router rip distance

configure router rip interface

configure router rip mode

configure router rip pacing

configure router rip passive

configure router rip redistribute

configure router rip timers

applicable systems:

All models.

configure router rip default_metric

This command sets the global default metric values for RIP.

parameter	definition
metric	Default metric The range is 1 - 4294967294; the default is 1.

syntax:

```
[ no ] default_metric < n >
```

example:

```
Alcatel-host/configure/router/rip> default_metric 4
```

This example configures the default metric to 4.

related commands

configure router rip distance

configure router rip interface

configure router rip mode

configure router rip pacing

configure router rip passive

configure router rip redistribute

configure router rip timers

applicable systems:

All models.

configure router rip distance

This command configures the distance value for RIP protocol on a router.

parameter	definition
distance	Distance value (enter a number) The range is 1 - 255; the default is 100.

syntax:

distance < n >

example:

Alcatel-host/configure/router/rip> **distance 25**

Table 19 Default Route Preference (Administrative Distance) Values

How Route is Learned	Default Preference	Command to Modify Default Preference
Directly connected network	0	Not configurable.
Static	1	Not configurable.
OSPF internal route	10	configure router ospf distance ospf non_external
RIP	100	configure router rip distance
Generated or aggregate	130	Applicable to BGP only, and is not configurable.
OSPF AS non-external route	150	configure router ospf distance ospf external
BGP	170	configure router bgp distance

related commands

configure router rip default_metric

configure router rip interface

configure router rip mode

configure router rip pacing

configure router rip passive

configure router rip redistribute

configure router rip timers

applicable systems:

All models.

configure router rip interface

This command enables RIP for an interface.

The interface is identified by the interface name. Use ethernet0 for Ethernet 0 and ethernet1 for Ethernet 1. WAN interfaces are identified by bundle names. If no other RIP interface command is given, then the interface is configured with default RIP parameters.

parameter	definition
name	ethernet0, ethernet1, or a bundle name
dci	PVC identifier; enter a number. Use only for an encapsulated fr bundle. The range is 16 - 1022.

syntax:

```
[ no ] configure router rip interface < name > [ dci < n > ]
```

example:

```
Alcatel-host/configure/router/rip> interface ethernet0
```

This example configures the Ethernet 0 interface for RIP.

next-level commands

configure router rip interface authentication

configure router rip interface distribute_list

configure router rip interface metric

configure router rip interface mode

configure router rip interface neighbor

configure router rip interface passive

configure router rip interface split_horizon

applicable systems:

All models.

configure router rip interface authentication

This command configures RIP-2 authentication for an interface.

The type of authentication and the key value to be used can be specified, but this is only valid with RIP version 2 (mode 3). When authentication is configured, all subsequent RIP updates contain authentication information. In addition, all subsequent incoming RIP packets on that interface are accepted only if they carry a valid authentication header.

parameter	definition
auth_type	The RIP-2 authentication algorithm.
simple	Use simple password authentication.
md5	Use MD5 authentication.
md5_cisco	Use Cisco MD5 compatibility.
line	The RIP-2 authentication password/key Enter an alphanumeric string of up to a maximum of 16 characters.

syntax:

```
[ no ] authentication auth_type line
```

example:

```
Alcatel-host/configure/router/rip/interface ethernet1> authentication md5 mymd5keyvalue
```

This example configures RIP interface Ethernet 1 for MD5 authentication.

related commands

```
configure router rip interface distribute_list
```

```
configure router rip interface metric
```

```
configure router rip interface mode
```

```
configure router rip interface neighbor
```

```
configure router rip interface passive
```

```
configure router rip interface split_horizon
```

applicable systems:

All models.

configure router rip interface distribute_list

This command configures the access list to be used to filter either incoming or outgoing routes for this interface.

This command is used in conjunction with the redistribute command.

parameter	definition
access_list	Access list number Enter a number.
direction	Traffic flow direction
in	Inbound
out	Outbound

syntax:

```
[ no ] distribute_list < n > < in | out >
```

example:

```
Alcatel-host/configure/router/rip/interface ethernet0> distribute_list 2 in
```

This example sets access list #2 to be used for all inbound routes for this interface.

related commands

configure router rip interface authentication

configure router rip interface metric

configure router rip interface mode

configure router rip interface neighbor

configure router rip interface passive

configure router rip interface split_horizon

applicable systems:

All models.

configure router rip interface metric

This command configures the metric value for RIP routes for this interface.

parameter	definition
metric	Default metric The range is 1 - 4294967294; the default is 1.

syntax:

```
[ no ] metric < n >
```

example:

```
Alcatel-host/configure/router/rip/interface ethernet0> metric 3
```

This example configures the RIP routes metric for interface Ethernet 0 to 3.

related commands

configure router rip interface authentication

configure router rip interface distribute_list

configure router rip interface mode

configure router rip interface neighbor

configure router rip interface passive

configure router rip interface split_horizon

applicable systems:

All models.

configure router rip interface mode

This command configures RIP mode for the specific interface.

This command is similar to the global RIP mode command, but it is only applicable to the current interface. Use this command to override the global RIP mode settings.

parameter	definition
mode	Enter a mode value.
1	RIP version 1
2	RIP version 2 (default)
3	RIP version 2 (V1 compatible)

syntax:

```
[ no ] mode < n >
```

example:

```
Alcatel-host/configure/router/rip/interface ethernet0> mode 1
```

This example configures interface Ethernet 0 for RIP version 1.

related commands

configure router rip interface authentication

configure router rip interface distribute_list

configure router rip interface metric

configure router rip interface neighbor

configure router rip interface passive

configure router rip interface split_horizon

applicable systems:

All models.

configure router rip interface neighbor

This command specifies a RIP neighbor for a specific interface.

Use this command multiple times to add multiple neighbors. When neighbors are specified, RIP updates are unicast to those neighbors (and not broadcast or multicast on that segment).

parameter	definition
ip_address	Neighbor IP address

syntax:

```
[ no ] neighbor < ip_address >
```

example:

```
Alcatel-host/configure/router/rip/interface ethernet0> neighbor 192.168.31.2
```

This example configures IP address 192.168.31.2 as a RIP neighbor of interface Ethernet 0.

related commands

configure router rip interface authentication

configure router rip interface distribute_list

configure router rip interface metric

configure router rip interface mode

configure router rip interface passive

configure router rip interface split_horizon

applicable systems:

All models.

configure router rip interface passive

This command configures RIP mode for a specific interface to passive (listen-only) mode. Use this command to override a global RIP mode configured for an interface.

syntax:

[no] passive

example:

```
Alcatel-host/configure/router/rip/interface ethernet1> passive
```

This example configures interface Ethernet 1 to listen-only mode.

related commands

configure router rip interface authentication

configure router rip interface distribute_list

configure router rip interface metric

configure router rip interface mode

configure router rip interface neighbor

configure router rip interface split_horizon

applicable systems:

All models.

configure router rip interface split_horizon

This command configures the split-horizon mechanism on an interface. By default, split horizon is enabled for all interfaces for poison-reverse.

parameter	definition
splitval	Split horizon algorithm
none	Disables split horizon.
simple	Enables split horizon.
poison	Enables poison reverse (default)

syntax:

```
[ no ] split_horizon < none | simple | poison >
```

example:

```
Alcatel-host/configure/router/rip/interface ethernet0> split_horizon simple
```

This example configures interface Ethernet 0 to do simple split-horizon.

related commands

configure router rip interface authentication

configure router rip interface distribute_list

configure router rip interface metric

configure router rip interface mode

configure router rip interface neighbor

configure router rip interface passive

applicable systems:

All models.

configure router rip mode

This command globally configures RIP mode for all interfaces.

Use this command to override the global mode setting.

parameter	definition
mode	Enter a mode value.
1	RIP version 1
2	RIP version 2 (default)
3	RIP version 2 (V1 compatible)

syntax:

[no] mode < n >

example:

```
Alcatel-host/configure/router/rip> mode 3
```

related commands

configure router rip default_metric

configure router rip distribute_list

configure router rip interface

configure router rip passive

configure router rip distance

configure router rip redistribute

applicable systems:

All models.

configure router rip pacing

This command enables RIP updates sent from this router to be released to the network in a controlled manner to avoid traffic bottlenecks.

When enabled, RIP updates from this router will be sent in several small intervals instead on one burst. This is useful when the number of routes to be sent is large (more than 1000).

syntax:

[no] pacing

example:

```
Alcatel-host/configure/router/rip> pacing
```

related commands

configure router rip default_metric

configure router rip distance

configure router rip interface

configure router rip mode

configure router rip passive

configure router rip redistribute

configure router rip timers

applicable systems:

All models.

configure router rip passive

This command configures RIP passive (listen only) mode.

All configured interfaces will only listen to RIP (version 1 and 2) updates, but will not send any updates. You can override the mode on a specific interface by configuring RIP mode for that specific interface.

syntax:

[no] passive

example:

```
Alcatel-host/configure/router/rip> passive
```

This example configures all RIP interfaces to listen-only mode.

related commands

configure router rip default_metric

configure router rip distance

configure router rip interface

configure router rip default mode

configure router rip pacing

configure router rip redistribute

configure router rip timers

applicable systems:

All models.

configure router rip redistribute

This command accesses the following next-level commands that configure the system to use RIP updates to redistribute routes learned from other routing protocols.

next-level commands

configure router rip redistribute bgp

configure router rip redistribute connected

configure router rip redistribute ospf

configure router rip redistribute static

applicable systems:

All models.

configure router rip redistribute bgp

This command configures RIP to redistribute bgp routes.

parameter	definition
as_number	Autonomous system number The range is 1 - 65535.
metric	Default metric The range is 1 - 16; the default is 1.

syntax:

```
redistribute bgp as_number [ metric < n > ]
```

example:

```
Alcatel-host/configure/router/rip> redistribute bgp 1
```

related commands

```
configure router rip redistribute connected
```

```
configure router rip redistribute ospf
```

```
configure router rip redistribute static
```

applicable systems:

All models.

configure router rip redistribute connected

This command configures RIP to redistribute connected routes.

parameter	definition
metric	Default metric The range is 1 - 16; the default is 1.

syntax:

```
[ no ] redistribute connected [ metric < n > ]
```

example:

```
Alcatel-host/configure/router/rip> redistribute connected
```

This example configures RIP to redistribute connected routes.

related commands

```
configure router rip redistribute bgp
```

```
configure router rip redistribute ospf
```

```
configure router rip redistribute static
```

applicable systems:

All models.

configure router rip redistribute ospf

This command configures RIP to redistribute OSPF routes.

parameter	definition
metric	Default metric The range is 1 - 16; the default is 1.

syntax:

```
[ no ] redistribute ospf [ metric < n > ]
```

example:

```
Alcatel-host/configure/router/rip> redistribute ospf
```

related commands

```
configure router rip redistribute bgp
```

```
configure router rip redistribute connected
```

```
configure router rip redistribute static
```

applicable systems:

All models.

configure router rip redistribute static

This command configures RIP to redistribute static routes.

parameter	definition
metric	Default metric The range is 1 - 16; the default is 1.

syntax:

```
[ no ] redistribute static [ metric < n > ]
```

example:

```
Alcatel-host/configure/router/rip> redistribute static
```

This example configures RIP to redistribute static routes.

related commands

configure router rip redistribute bgp

configure router rip redistribute connected

configure router rip redistribute ospf

applicable systems:

All models.

configure router rip timers

This command accesses the following next-level commands that configure the global RIP timers.

next-level commands

configure router rip timers flush

configure router rip timers holddown

configure router rip timers update

applicable systems:

All models.

configure router rip timers flush

This command configures the global RIP flush timer.

This is the time interval in seconds that must pass before the route is removed from the routing table. This value should be configured to be greater than the configured holddown time value.

parameter	definition
time	Flush timer value in seconds The range is 1 - 65535; the default is 180.

syntax:

[no] flush time < n >

example:

```
Alcatel-host/configure/router/rip/timers> flush 300
```

This example configures the global RIP flush timer to 300 seconds.

related commands

configure router rip timers holddown

configure router rip timers update

applicable systems:

All models.

configure router rip timers holddown

This command configures the global RIP hold down timers.

Hold down time is the interval in seconds during which routing information regarding better routes is suppressed. This should be configured to be at least twice the value of the update timers.

parameter	definition
time	Holddown timer value in seconds The range is 1- 65535; the default is 180.

syntax:

[no] holddown time < n >

example:

```
Alcatel-140/configure/router/rip/timers> holddown 200
```

This example configures the global RIP hold down timers to suppress information about routes for 200 seconds.

related commands

configure router rip timers flush

configure router rip timers update

applicable systems:

All models.

configure router rip timers update

This command configures the global RIP update timer.

This timer specifies the interval in seconds for sending periodic RIP updates.

parameter	definition
time	Update timer in seconds The range is 1 - 65536; the default is 120.

syntax:

[no] update time < n >

example:

Alcatel-host/configure/router/rip/timers> **update 45**

This example globally configures RIP updates to occur every 45 seconds.

related commands

configure router rip timers flush

configure router rip timers holddown

applicable systems:

All models.

RIP SHOW COMMANDS

Use RIP display/show commands to display all configured RIP information.

show ip rip

This command accesses the following next-level commands that display more specific information.

next-level commands

show ip rip global

show ip rip interface

show ip rip statistics

applicable systems:

All models.

show ip rip global

This command displays global configured information about mode, distance, default metric, and timers for RIP.

syntax:

```
show ip rip global
```

example:

```
Alcatel-host> show ip rip global
```

screen display example

```
> show ip rip global
Router RIP is enabled
  Mode: RIP 2
  Distance: 100
  Default Metric: 1
  Timers:
    Update: 30 seconds
    Holddown: 120 seconds
    Flush: 180 seconds
>
```

related commands

show ip rip interface

show ip rip routes

show ip rip statistics

applicable systems:

All models.

show ip rip interface

This command accesses the following next-level commands that display configuration information about mode, metric, authentication, split horizon, and routers for the RIP interface.

next-level commands

show ip rip interface all

show ip rip interface bundle

show ip rip interface ethernet

show ip rip interface statistics

applicable systems:

All models.

show ip rip interface all

This command displays information about all configured RIP interfaces.

syntax:

```
show ip rip interface all
```

example:

```
Alcatel-host> show ip rip interface all
```

screen display example

```
> show ip rip interface all
RIP is configured for interface <ethernet0>
  Mode: RIP 2
  Metric: 5
  Authentication: None
  Split Horizon: Poison
  Routers : None
  Interface state:  Broadcast Multicast Active

>
```

related commands

show ip rip interface bundle

show ip rip interface ethernet

show ip rip interface statistics

applicable systems:

All models.

show ip rip interface bundle

This command displays RIP information for a configured bundle.

parameter	definition
bundle_name	The name of the desired bundle. Enter a string of up to a maximum of 8 characters.
pvc	PVC identifier Used only for an encapsulated fr bundle. The range is 16 - 1022.

syntax:

```
show ip rip interface bundle < name >
```

example:

```
Alcatel-host> show ip rip interface bundle Dallas
```

related commands

```
show ip rip interface all
```

```
show ip rip interface ethernet
```

```
show ip rip interface statistics
```

applicable systems:

All models.

show ip rip interface ethernet

This command displays RIP information about the Ethernet interface.

syntax:

```
show ip rip interface ethernet < 0 | 1 >
```

example:

```
Alcatel-host> show ip rip interface ethernet0
```

screen display example

```
> show ip rip interface ethernet 0
RIP is configured for interface <ethernet0>
  Mode: RIP 2
  Metric: 5
  Authentication: None
  Split Horizon: Poison
  Routers : None
  Interface state:  Broadcast Multicast Active

>
```

related commands

show ip rip interface all

show ip rip interface bundle

show ip rip interface statistics

applicable systems:

All models.

show ip rip interface statistics

This command displays global RIP interface statistics, such as the number of pad packets received, the number of bad routes received, and the number of triggered updates sent.

syntax:

```
show ip rip interface statistics
```

example:

```
Alcatel-host> show ip rip interface statistics
```

screen display example

```
> show ip rip interface statistics

RIP Interface Statistics:
=====

Interface: <ethernet0>
    Number of bad packets received   : <0>
    Number of bad routes received    : <0>
    Number of Triggered updates sent : <0>

>
```

related commands

```
show ip rip interface all
```

```
show ip rip interface bundle
```

```
show ip rip interface ethernet
```

applicable systems:

All models.

show ip rip statistics

This command shows global RIP statistics, such as route changes and queries.

syntax:

```
show ip rip statistics
```

example:

```
Alcatel-host> show ip rip statistics
```

screen display example

```
Show ip rip statistics

RIP Global Statistics:
=====

Number of Global Route Changes : <0>
Number of Global Queries       : <0>

>
```

related commands

show ip rip global

show ip rip interface

show ip rip routes

applicable systems:

All models.

MULTICASTING

Multicasting Overview

Traditional multicast routing mechanisms such as Distance Vector Multicast Routing Protocol (DVMRP) and Multicast Open Shortest Path First (MOSPF) were intended for use within regions where groups are densely populated or bandwidth is universally plentiful. When groups, and senders to these groups, are distributed sparsely across a wide area, these “dense mode” schemes do not perform efficiently.

Protocol Independent Multicast (PIM)

Protocol Independent Multicast (PIM) protocols route multicast packets to multicast groups. PIM is protocol independent because it can leverage whichever unicast routing protocol is used to populate unicast routing table. There are two modes of PIM protocol – Dense mode (DM) and Sparse mode (SM). Alcatel supports SM only in version 8.0 and higher.

PIM-DM floods multicast traffic throughout the network initially and then generates prune messages as required. PIM-SM attempts to send multicast data only to networks which have active receivers. This is achieved by having a common Rendezvous Point (RP) known to the senders and receivers and by forming shared trees from the RP to the receivers.

PIM-SM is described in RFC 2362.

PIM Commands

The general PIM commands supported in this release are:

Global parameters

Enable PIM	<code>/configure/ip> pim</code>
Configure PIM mode	<code>/configure/ip/pim> mode [sparse dense]</code>
Configure Assert Holdtime	<code>/configure/ip/pim> assert-holdtime <time></code>
Configure Hello Interval	<code>/configure/ip/pim> hello-interval <time></code>
Configure Hello Holdtime	<code>/configure/ip/pim> hello-holdtime <time></code>
Configure Hello priority	<code>/configure/ip/pim> hello-priority <value></code>
Configure Join/Prune Holdtime	<code>/configure/ip/pim> join-prune-holdtime <time></code>
Configure Join /Prune Interval	<code>/configure/ip/pim> join-prune-interval <time></code>
Configure MRT Period	<code>/configure/ip/pim> mrt-period <time></code>
Configure MRT Stale Multiplier	<code>/configure/ip/pim> mrt-stale-mult <number></code>

Configure MRT SPT Multiplier	/configure/ip/pim> mrt-spt-multiplier <number>
Configure Probe Period	/configure/ip/pim> probe-period <time>
Configure Registration suppression timeout	/configure/ip/pim> register-suppress-timeout <time>
Configure DR to switch immediate	/configure/ip/pim> dr-switch-immediate
Configure RP to switch immediate	/configure/ip/pim> rp-switch-immediate
Configure Threshold for DR	/configure/ip/pim> threshold-dr <bps>
Configure Threshold for RP	/configure/ip/pim> threshold-rp <bps>
Configure to calculate whole packet checksum (for cisco interop)	/configure/ip/pim> whole-packet-checksum

Bootstrap Router related Commands

Configure as candidate BSR	/configure/ip/pim/cbsr> address <address>
Configure CBSR period	/configure/ip/pim/cbsr> period <time>
Configure CBSR holdtime	/configure/ip/pim/cbsr> holdtime <time>
Configure CBSR priority	/configure/ip/pim/cbsr> priority <value>

RP commands

Configure as candidate RP	/configure/ip/pim> crp
Configure as candidate RP address	/configure/ip/pim/crp> address <ipaddress>
Configure candidate RP group for advertisement	/configure/ip/pim/crp> group-add <address> [mask] [priority]
Configure as candidate RP holdtime	/configure/ip/pim/crp> holdtime <time>
Configure as candidate RP period	/configure/ip/pim/crp> period <time>
Configure as candidate RP priority	/configure/ip/pim/crp> priority <value>
Configure a static RP address	/configure/ip/pim/> rp <address> <gaddress> [mask]

Interface based parameters

Configure PIM for an interface	/configure/ip/pim> interface <interface_name>[:dlci_no]
Configure PIM mode for an interface	/configure/ip/pim/interface wan1> mode [sparse dense ssm sparse-ssm]
Configure PIM interface assert holdtime	/configure/ip/pim/interface wan1> assert-holdtime <time>

Configure PIM interface hello holdtime	/configure/ip/pim/interface wan1> hello-holdtime <time>
Configure PIM interface hello interval	/configure/ip/pim/interface wan1> hello-interval <time>
Configure PIM interface Join/Prune Delay Timeout	/configure/ip/pim/interface wan1> join-prune-timeout <time>
Configure PIM interface Join/Prune Interval	/configure/ip/pim/interface wan1> join-prune-interval <time>
Configure PIM interface Join/Prune holdtime	/configure/ip/pim/interface wan1> join-prune-holdtime <time>
Configure PIM interface as border of PIM domain	/configure/ip/pim/interface wan1> boundary

SSM range

Configure the SSM range	/configure/ip/pim> ssm-range <group-address> <group-mask>
-------------------------	--

The show and debug PIM commands are:

Display PIM global configuration	Alcatel> show ip pim global
Display PIMC timers	Alcatel> show ip pim timers
Display PIM interfaces	Alcatel> show ip pim interfaces
Display PIM neighbors	Alcatel> show ip pim neighbors
Display PIM Bootstrap info	Alcatel> show ip pim bsr-info
Display PIM Candidate RP info	Alcatel> show ip pim crp-info
Display PIM statistics	Alcatel> show ip pim statistics
Display PIM RP set	Alcatel> show ip pim rp-set
Display PIM Static RP	Alcatel> show ip pim rp
Trace PIM packets	Alcatel >debug ip pim packet <pkt_type> <direction> [interface_name] [dlc]
Trace PIM state changes	debug ip pim state
Trace PIM routes	debug ip pim route
Trace PIM detail	debug ip pim detail
Trace PIM debug	debug ip pim debug
All Traces	Alcatel> debug ip pim all

Protocol Independent Multicast - Source Specific Multicast (PIM-SSM)

By running PIM-SSM and IGMPv3, you can implement a Source Specific Multicast (SSM) service model in your network. PIM-SSM functionality is the subset of PIM-SM functionality dealing only with source-specific distribution trees. IGMPv3 provides a way to detect channel subscriptions; for example, host-initiated (S,G) joins where G falls within the defined range of SSM multicast group addresses.

PIM-SSM can be run in the absence of IGMPv3. Even when they are both running, they do not need to run on the same interfaces. For example, you might not want to run PIM-SSM (or PIM-SM, for that matter) over an interface that leads to a stub network. Similarly, if a network cannot contain local IGMPv3 receivers (for example, on a DMZ network), then there is no need to run IGMPv3.

PIM-SSM Command `ip pim ssm-range`

Internet Group Management Protocol (IGMP)

Internet Group Management Protocol (IGMP) is enabled on hosts and routers that want to receive multicast traffic. IGMP informs locally-attached routers of their multicast group memberships. Hosts inform routers of the groups of which they are members by multicasting IGMP Group Membership Reports. When multicast routers listen for these reports, they can exchange group membership information with other multicast routers. This reporting system allows distribution trees to be formed to deliver multicast datagrams. The original version of IGMP was defined in RFC 1112, Host Extensions for IP Multicasting. Extensions to IGMP, known as IGMP version 2.

IGMPv2 improves performance and supports the following message types:

- IGMP Query: IGMP Query is sent by the router to know which groups have members on the attached network.
- IGMP Reports: IGMP reports are sent as a response to the query by hosts to announce their group membership. Reports can be sent “unsolicited” when the hosts come up.
- IGMP Leaves: IGMP Leaves are sent by the host when it relinquishes membership of a group.

The latest extension to the IGMP standard is Version 3, which includes interoperability with version 2 and version 1 hosts, also provides support for source filtering. Source filtering enables a multicast receiver host to signal to a router which groups it wants to receive multicast traffic from, and from which source(s) this traffic is expected. This membership information enables the router to forward traffic only from those sources from which receivers requested the traffic.

IGMPv3 supports applications that explicitly signal sources from which they want to receive traffic. With IGMPv3, receivers signal membership to a multicast host group in the following two modes:

- INCLUDE mode: In this mode, the receiver announces membership to a host group and provides a list of IP addresses (the INCLUDE list) from which it wants to receive traffic.
- EXCLUDE mode: In this mode, the receiver announces membership to a host group and provides a list of IP addresses (the EXCLUDE list) from which it does not want to receive traffic. This indicates that the host wants to receive traffic only from other sources whose IP addresses are not listed in the EXCLUDE list. To receive traffic from all sources, like in the case of the Internet Standard Multicast (ISM) service model, a host expresses EXCLUDE mode membership with an empty EXCLUDE list.

IGMPv3 is used by the hosts to express their desire to be a part of the source-specific multicast (SSM) which is an emerging standard used by routers to direct multicast traffic to the host only if it is from a specific source.

IGMP Commands The IGMP commands supported in version 8.0 and higher are:

Enabling igmp	/configure > ip igmp
Disabling igmp	/configure > no ip igmp
Enabling igmp	/configure/ip/igmp> interface <interface-name>[: dcli-no]
Disabling igmp	/configure/ip/igmp> no interface <interface-name>
Configuring version	/configure/ip/igmp/interface ethernet0> version <version>
Configuring Query Interval	/configure/ip/igmp/interface ethernet0> query-interval <interval>
Configuring Maximum Response Time	/configure/ip/igmp/interface ethernet0> query-response-interval <interval>
Configuring Last Member Query Interval	/configure/ip/igmp/interface ethernet0> last-member-query-interval <interval>
Configuring Last Member Query Count	/configure/ip/igmp/interface ethernet0> last-member-query-count <value>
Configuring Startup Query Interval	/configure/ip/igmp/interface ethernet0> startup-query-interval <interval>
Configuring Startup Query Count	/configure/ip/igmp/interface ethernet0> startup-query-count <count>
Configuring Robustness	/configure/ip/igmp/interface ethernet0> robustness <value>
Configuring Ignore-v1-message	/configure/ip/igmp/interface ethernet0> [no] ignore-v1-messages
Configuring Ignore-v2-message	/configure/ip/igmp/interface ethernet0> [no] ignore-v2-messages
Configuring Send Router Alerts	/configure/ip/igmp/interface ethernet0> [no] send-router-alert
Configuring Require Router Alerts	/configure/ip/igmp/interface ethernet0> [no] require-router-alert
Assigning filter list for group filtering	/configure/ip/igmp/interface ethernet0> group-filter <filter-list-name>

Debug Command

Enable all debug levels	/debug> [no] ip igmp all
Debug state related events	/debug> [no] ip igmp state
Debug normal events	/debug> [no] ip igmp normal
Debug query packets	/debug> [no] ip igmp packet query [inbound outbound]
Debug report packets	/debug> [no] ip igmp packet report [inbound outbound]
Debug leave packets	/debug> [no] ip igmp packet leave [inbound outbound]

Show Commands

Displaying IGMP group membership information `show ip igmp groups {all | <interface-name>} [detail]`

Displaying IGMP interface configuration `show ip igmp interface {all | <interface-name>}`

Clear Command

Clearing IGMP group membership information `clear ip igmp groups [interface <name>] [group-addr <addr>] [source-addr <source-addr>]`

Traceroute Facility for IP Multicast

With multicast distribution trees, tracing from a source to a multicast destination is difficult, since the branch of the multicast tree on which the destination lies is unknown. The technique used by the **traceroute** tool to trace unicast network paths will not work for IP multicast because traceroute (ICMP) responses are specifically forbidden for multicast traffic. Thus, you have to flood the whole tree to find the path from one source to one destination. However, walking up the tree from destination to source is easy, as most existing multicast routing protocols know the previous hop for each source. Tracing from destination to source involves only routers on the direct path.

To request a traceroute (which does not have to be the source or the destination), send a traceroute query packet to the last-hop multicast router for the given destination. The last-hop router turns the query into a request packet by adding a response data block containing its interface addresses and packet statistics, and then forwards the request packet using unicast to the router that it believes is the proper previous hop for the given source and group. Each hop adds its response data to the end of the request packet, then unicast forwards it to the previous hop. The first hop router (the router that believes that packets from the source originate on one of its directly connected networks) changes the packet type to indicate a response packet and sends the completed response to the response destination address. The response may be returned before reaching the first hop router if a fatal error condition such as “no route” is encountered along the path.

Multicast traceroute uses any information available to it in the router to try to determine a previous hop to forward the trace towards. Multicast routing protocols vary in the type and amount of state they keep; multicast traceroute tries to work with all of them by using whatever is available. For example, if a DVMRP router has no active state for a particular source but does have a DVMRP route, it chooses the parent of the DVMRP route as the previous hop. If a PIM-SM router is on the (*,G) tree, it chooses the parent towards the RP as the previous hop. In these cases, no source/group-specific state is available, but the path may still be traced.

Alcatel’s version 8.0 and higher for Ties supports the following PIM related feature—a “traceroute” facility for IP multicast, as defined in draft-ietf-idmr-traceroute-ipm-05.

Multicast Multipath

The multicast multipath feature in version 8.0 and higher allows load balancing on multicast traffic across equal cost paths. Equal cost multipath routing is useful when multiple equal cost routes to the same destination exist. These routes can be discovered and be used to provide load balancing among redundant paths. Commonly used methods for multipath forwarding are Round-Robin and Random. While these methods do provide a form of load balancing, but variable path MTUs, variable latencies, and debugging can limit the effectiveness of these methods.

The following methods have been developed to deal with the load balancing limitations of the Round-Robin and Random methods:

- **Modulo-N Hash** —To select a next-hop from the list of N next-hops, the router performs a modulo-N hash over the packet header fields that identify a flow.”
- **Hash-Threshold**—The router first selects a key by performing a hash over the packet header fields that identify the flow. The N next-hops have been assigned unique regions in the hash functions output space. By comparing the hash value against region boundaries the router can determine which region the hash value belongs to and thus which next-hop to use.
- **Highest Random Weight (HRW)**—The router computes a key for each next-hop by performing a hash over the packet header fields that identify the flow, as well as over the address of the next-hop. The router then chooses the next-hop with the highest resulting key value.

The Round-Robin and Random methods are disruptive by design (that is, if there is no change to the set of next-hops, the path a flow takes changes every time). Modulo-N, Hash Threshold, and HRW are not disruptive.

RFC 2991 recommends to use HRW method to select the next-hop for multicast packet forwarding. or this reason, Alcatel-only scenarios apply the HRW method as the default. This is similar to the Cisco Systems IPv6 multicast multipath implementation.

Multipath Commands

The following table lists the multipath commands:

Enabling HRW method	<code>/configure/ip/multicast> multipath</code>
Enabling Cisco method	<code>/configure/ip/multicast> multipath cisco</code>
Disabling Multipath	<code>/configure/ip/multicast> no multipath</code> <code>/configure/ip/multicast> no multipath cisco</code>
Display RPF selection	<code>Alcatel> show ip rpf <addr></code> <code><addr> - source or RP address</code>

When multipath is disabled, Alcatel selects the nexthop address with lowest ip address. For equal cost routes the nexthops are stored in the increasing (ascending) order of IP address. **show ip rpf** command displays the selected path, based on the configured multipath method and the nexthops of the best route to the IP address passed.

Generic Routing Encapsulation (GRE)

Generic Routing Encapsulation (GRE) handles the transportation of IP multicast traffic between two sites that have only IP unicast connectivity. Using tunnels in a VPN environment is important because IPSec encryption is limited to IP unicast frames. IPSec over GRE tunneling allows for the encryption and the transportation of multiprotocol traffic across the VPN since both unicast and multicast IP packets appear to the IPSec protocol as IP unicast frame after GRE tunneling. If all connectivity must go through the home gateway router, tunnels also enable the use of private network addressing across a service provider's backbone without the need for running the Network Address Translation (NAT) feature.

The Alcatel implementation of the Generic Routing Encapsulation (GRE) tunneling protocol is based on standards RFC1701 and RFC2784.

GRE can encapsulate a wide variety of protocol packet types inside IP tunnels, creating a virtual point-to-point link between routers at remote points over an IP network. An IP tunnel is a logical interface that provides a way to encapsulate passenger packets inside a transport protocol. By connecting multiprotocol subnetworks in a single-protocol backbone environment, IP tunneling using GRE allows network expansion across a single-protocol backbone environment.

For more information on GRE, refer to the *GRE Configuration Guide*.

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CORPORATE POLICY

Standard Warranty

Hardware

Alcatel warrants that the Hardware sold hereunder shall be free of defects in workmanship for a period of one (1) year from the Date of Shipment. In the event that Alcatel receives notice from the Customer during the warranty period that any Hardware does not conform to this warranty, Alcatel, shall, at its sole option, either repair or replace the non-conforming Hardware. If said notice is received within ninety (90) days of shipment from the Alcatel factory in 26801 West Agoura Road Calabasas, CA 91301, such replacement shall be "Next Business Day." If said notice is received after ninety (90) days from shipping from Alcatel, the Customer must ship the defective Hardware to Alcatel for repair. Such repair shall take no more than ten (10) business days. Cost of shipping to Alcatel shall be at the Customer's expense. Cost of shipping the repaired unit to the Customer shall be at Alcatel's expense. Under the terms of any such warranty, Hardware may be replaced with refurbished or new Hardware at Alcatel's option.

For instructions on obtaining Return Material Authorization (RMA), which is required before Hardware under warranty can be returned to Alcatel, refer to [Procedures](#) below.

Software

Alcatel warrants that the media on which the Software is recorded shall be free from defects in material and workmanship under normal use for a period of ninety (90) days from the Date of Shipment. The Customer's sole and exclusive remedy, and Alcatel sole and exclusive liability, shall be replacement of the media in accordance with this limited warranty. The Customer shall be entitled to free Software upgrades (bug fixes and feature enhancements not listed as separate cost options of the Alcatel price list) from the Alcatel website for the first ninety (90) days after shipment from Alcatel.

Technical Support

Online, phone, and email Technical Support is provided free of charge for a period of ninety (90) days from the Date of Shipment. Technical Support is available online at the Alcatel website: www.alcatel.com, by phone at: 800 995 2696 (within the United States) or 800 995 4507 (outside the United States), or by email at: support@ind.alcatel.com. Technical Support provides the following services:

- Technical Support will assist the Customer in determining if problems encountered with Alcatel products are due to errors or limitations in the current Alcatel operating system and advise the Customer on the availability of Software updates or workarounds.
- Technical Support will provide assistance to the Customer regarding questions concerning the installation of Software updates and configuration questions arising from Software updates.
- Technical Support will work with the Customer to develop and implement appropriate network configurations.

Procedures

A product may only be returned with the prior written approval of Alcatel. Such approval shall reference a Return Material Authorization (RMA) number issued by authorized Alcatel Technical Support personnel. To contact Alcatel Technical Support, call 800 995 2696 (within the United States) or 800 995 4507 (outside the United States), or email at support@ind.alcatel.com. Transportation costs, if any, incurred in connection with the return of a defective item to Alcatel shall be borne by the Customer. Transportation costs incurred in connection with the re-delivery of a repaired or replaced item to the Customer shall be borne by Alcatel. However, such costs shall be borne by the Customer if Alcatel reasonably determines that the product is not defective. If Alcatel determines, in its sole discretion, that the allegedly defective product is not covered by the terms of the warranty provided hereunder, or that a warranty claim is made after the warranty period, the cost of repair by Alcatel, including all shipping expenses, shall be reimbursed by the Customer. Alcatel, shall have no liability with respect to data contained in any system returned to Alcatel.

For complete contact information for Alcatel, see [Contacting Alcatel](#) below.

Exclusions

The foregoing warranties and remedies are for the Customer's exclusive benefit and are non-transferable. Any and all warranties shall be void regarding System components that are damaged or rendered unserviceable by: (1) acts or omissions of non-Alcatel personnel; (2) misuse, theft, vandalism, fire, water, or other peril; (3) alterations of or additions to the System or any element thereof performed by personnel not certified by Alcatel to perform such alterations and additions or (4) the Customer's failure to meet environmental specifications.

Non-Alcatel Products

In circumstances where a product not manufactured or created by Alcatel is sold by Alcatel hereunder to complete an order, the Customer's sole remedy shall be pursuant to the original manufacturer's/licensor's warranty to the Customer, to the extent permitted by the original manufacturer/licensor.

Disclaimer of Warranty

The limited warranties referred to in paragraphs above shall be in lieu of all other warranties whether expressed, implied, statutory, or otherwise. Alcatel specifically disclaims any implied warranties of merchantability or fitness for a particular purpose.

Limitation of Liability

Alcatel and its suppliers exclude themselves from any liability for any lost revenue or profit, loss of business, loss of information or data, or for special, indirect, consequential, incidental, or punitive damages of any kind caused out of or in connection with the sale, installation, maintenance, use, performance, failure, or interruption of its products, even if Alcatel and its authorized resellers have been advised of the possibility of such damages. In no event shall Alcatel or its supplier's total liability to the Customer, whether in contract negligence, strict liability, tort or otherwise, exceed the price paid by the Customer. The foregoing limitations shall apply even if any remedy provided herein shall fail its essential purpose.

Equipment Malfunction

In the event this equipment should fail to operate properly, disconnect the unit from the telephone line and contact Alcatel Technical Support at the address and phone number listed in below. **DO NOT DISASSEMBLE THIS EQUIPMENT.** This equipment does not contain any user-serviceable components. If the equipment is causing harm to the network, the telephone company may request that you disconnect this equipment from the telephone network until the problem is resolved.



Contacting Alcatel

Telephone	818 880 3500
Fax	818 880 3505
Mail	26801 West Agoura Road Calabasas, CA 91301
Sales	818 880 3500
Support	800 995 2696 (US) 800 995 4507 (International)
Email	support@ind.alcatel.com
Internet	http://eservice.ind.alcatel.com
