

DistributedDirector Enhancements for Cisco IOS Release 11.1(25)IA

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Feature Overview

The DistributedDirector Enhancements for Cisco IOS Release 11.1(25)IA feature consists of the following four new features for the Cisco DistributedDirector:

- Support for DNS Mail Exchange Records
- Policy Redirection
- Unlimited Number of IP Addresses Per Virtual Hostname
- Per-Hostname Time-to-Live

Support for DNS Mail Exchange Records

The Support for Domain Name System (DNS) Mail Exchange (MX) Records feature enables transparent global load distribution of Simple Mail Transfer Protocol (SMTP)-based e-mail services. This enables Cisco DistributedDirector to redirect client e-mail requests to the best SMTP server by way of a single DNS MX Resource Record. Cisco DistributedDirector then sends a single DNS MX resource record to the client that identifies the best available SMTP server. Cisco DistributedDirector can use all of its decision-making metrics to determine the best SMTP server for a client request.

Policy Redirection

The Policy Redirection feature enables the Cisco DistributedDirector to direct IP services to a single server or distribute IP service requests across a subset of servers based on IP address and mask. This feature also introduces special access control lists (ACLs) that identify a set of servers to be used for queries for a specific DistributedDirector host name.

Unlimited Number of IP Addresses Per Virtual Hostname

The Unlimited Number of IP Addresses Per Virtual Hostname feature enables the Cisco DistributedDirector to support an unlimited number of IP addresses per virtual host name. Previously, each virtual host name could only support a maximum of eight IP addresses.

Per-Hostname Time-to-Live

The Per-Hostname Time-to-Live (TTL) feature enables Cisco DistributedDirector to configure the TTL values of its Domain Name System (DNS) resource records. Each virtual host name can have a unique TTL configuration. This feature applies only to address and mail exchange resource records generate by Cisco DistributedDirector—not resource records relayed from a forwarding server through Cisco DistributedDirector.

Benefits

Support for DNS Mail Exchange Records

The Support for DNS Mail Exchange Records feature enables transparent global load distribution of SMTP-based e-mail services by Cisco DistributedDirector.

Policy Redirection

The Policy Redirection feature provides additional granular control over traffic redirection decisions. It is particularly useful in environments that need to redirect known client populations to specific servers.

Unlimited Number of IP Addresses Per Virtual Hostname

The Unlimited Number of IP Addresses Per Virtual Hostname feature increases the scalability of the Cisco DistributedDirector by allowing virtual host names to support as many IP addresses as is necessary.

Per-Hostname Time-to-Live

The Per-Hostname Time-to-Live feature provides increased flexibility when multiple virtual host names are configured on a Cisco DistributedDirector.

Restrictions

Per-Hostname Time-to-Live

The Per-Hostname Time-to-Live feature only returns TTL values generated by the Cisco DistributedDirector—not those relayed from a forwarding server through Cisco DistributedDirector.

Related Documents

For more information on the Cisco DistributedDirector, see the following documents, which are located on CCO at <http://www.cisco.com/univercd/cc/td/doc/product/iaabu/distrdir/index.htm>:

- Cisco DistributedDirector Enhancements for Release 11.1(18)IA
- Cisco DistributedDirector 2500 Series Install and Config Guide
- Cisco DistributedDirector 4700-M Install and Config Guide
- Release Notes for Cisco DistributedDirector System Software

Supported Platforms

- DistributedDirector 2501
- DistributedDirector 2502
- DistributedDirector 4700-M

Supported Standards, MIBs, and RFCs

Standards

None

MIBs

None

For descriptions of supported MIBs and how to use MIBs, see the Cisco MIB web site on CCO at <http://www.cisco.com/public/sw-center/netmgmt/cmtk/mibs.shtml>.

RFCs

None

Prerequisites

Support for DNS Mail Exchange Records

Cisco DistributedDirector must be used in DNS Caching Nameserver mode.

Policy Redirection

Cisco DistributedDirector can be used in DNS Caching Nameserver mode or HTTP Redirect mode.

Configuration Tasks

See the following sections for configuration tasks for the DistributedDirector Enhancements for Cisco IOS Release 11.1(25)IA feature:

- Configuring Support for DNS Mail Exchange Records
- Configuring Policy Redirection

- Configuring More than Eight IP Addresses for a Virtual Host name
- Configuring TTL for Individual Virtual Host names

Configuring Support for DNS Mail Exchange Records

Step	Command	Purpose
1	Router(config)# ip host <i>hostname</i> mx <i>preference</i> <i>target-hostname</i>	Specifies the host name of servers that are to receive DNS MX queries.
2	Router(config)# ip host [additional] [<i>tcp-port-number</i>] <i>address1</i> [<i>address2</i> ... <i>addressN</i>]	Identifies the DistributedDirector servers.
3	Router(config)# ip director host <i>hostname</i> mx priority { [drp-ser <i>n</i>] [drp-int <i>n</i>] [drp-ext <i>n</i>] [drp-rtt <i>n</i>] [portion <i>n</i>] [random <i>n</i>] [admin <i>n</i>]}	Specifies how the DistributedDirector will select a server when it receives a DNS MX query for the specified host name.
4	Router(config)# ip director host <i>hostname</i> mx connect <i>port</i> [interval] <i>connection-interval</i>	(Optional) Specifies how often the DistributedDirector will verify that the remote servers are still active.

Configuring Policy Redirection

Step	Command	Purpose
1	Router(config)# ip host <i>hostname</i> [additional] <i>ip-address1</i> ... <i>ip-addressN</i>	Defines the specified IP addresses as members of the domain of the host name.
2	Router(config)# ip director access-list <i>access-list-number</i> [permit deny] <i>expression</i>	Creates the access list for the server. Repeat this command to enter all the criteria for the access list.
3	Router(config)# ip director access-group <i>access-group-number</i>	(Optional) Configures the DistributedDirector to use the specified access list to select which host names will receive Director sorting.
4	Router(config)# access-list <i>access-list-number</i> [permit deny] <i>source</i> [<i>source-wildcard</i>] [log]	(Optional) Configures the access list for the server.
5	Router(config)# ip director server <i>ip-address</i> access-group <i>access-list-number</i>	Associates this access list with the server.
6	Router(config)# ip director host <i>hostname</i> access-control	Enables access lists on the Distributed Director.

Configuring More than Eight IP Addresses for a Virtual Host name

Command	Purpose
Router(config)# ip host <i>hostname</i> [additional] <i>ip-address1</i> <i>ip-address2</i> ... <i>ip-addressN</i>	Defines the specified IP addresses as members of the domain of the host name. Note If you use the additional keyword, the IP addresses will be appended to any IP addresses that are already configured for the host name. If you do not use the additional keyword, the IP addresses will replace any IP addresses that are already configured for the host name.

Configuring TTL for Individual Virtual Host names

Command	Purpose
Router(config)# ip director host <i>hostname</i> t11 <i>seconds</i>	Specifies the TTL value for address and mail exchange resource records generated by Cisco DistributedDirector.

Verifying the DistributedDirector Enhancements

This section provides information on verifying the following DistributedDirector enhancements:

- Verifying Support for DNS Mail Exchange Records
- Verifying Policy Redirection
- Verifying Host IP Addresses
- Verifying Per-Hostname TTL
- Viewing DistributedDirector Debugging Messages

Verifying Support for DNS Mail Exchange Records

To verify that the DistributedDirector is configured to support DNS MX records, use the **show ip director hosts** and **show host** commands. If you see output similar to the following, the DistributedDirector is configured correctly:

```
DD# show ip director hosts mail.foo.com
Host mail.foo.com (MX queries):
  Servers:
    Server 10.0.0.1:
      Advertised 0 times, last at 00:00:00
      Corresponding DRP agent is 10.0.0.1
    Server 10.0.0.2:
      Advertised 0 times, last at 00:00:00
      Corresponding DRP agent is 10.0.0.2
  Host specific priorities:
    random = 1
DD# show host
Default domain is cisco.com
Name/address lookup uses domain service
Name servers are 171.69.2.132

Host                Flags      Age Type  Address(es)
mail.foo.com        (perm, OK) 0  IP    172.31.94.129
                   (perm, OK) 0  MX    10 mail1.foo.com
                   (perm, OK) 0  MX    20 mail2.foo.com
mail2.foo.com       (perm, OK) 0  IP    10.0.0.2
mail1.foo.com       (perm, OK) 0  IP    10.0.0.1
```

This output is produced when the DistributedDirector is configured as specified in the “Support for DNS Mail Exchange Records” configuration example.

Verifying Policy Redirection

To verify that the DistributedDirector is configured for policy redirection, first use the **show ip director access-list** command to verify the access lists:

```
DD> show ip director access-list 1
Director Agent Names access list 1
permit 10.0.0.0 0.255.255.255
```

Then use the **show ip director hosts** command to view how the access list is applied:

```
DD> show ip director hosts mail.foo.com
Host mail.foo.com (MX queries):
  Using access-lists to choose servers for selection
  Servers:
    Server 10.0.0.1:
      Advertised 0 times, last at 00:00:00
      Default access-group:1
      Corresponding DRP agent is 10.0.0.1
    Server 10.0.0.2:
      Advertised 0 times, last at 00:00:00
      Corresponding DRP agent is 10.0.0.2
  Host specific priorities:
    random = 1
```

This output is produced when the DistributedDirector is configured as specified in the “Policy Redirection” configuration example.

Verifying Host IP Addresses

To view the configured IP addresses for a host name, use the **show host** command. If you include the **additional** keyword, the IP addresses will be added to any previously configured IP addresses:

```
DD(config)# ip host big.foo.com 10.0.0.1 10.0.0.2 10.0.0.3 10.0.0.3 10.0.0.4 10.0.0.5
10.0.0.6 10.0.0.7 10.0.0.8
DD(config)# ip host big.foo.com additional 10.0.0.9 10.0.0.10
DD(config)# exit
DD# show ip host big.foo.com
Host                Flags          Age Type  Address(es)
big.foo.com         (perm, OK)    0   IP    10.0.0.1 10.0.0.2
                   10.0.0.3 10.0.0.4
                   10.0.0.5 10.0.0.6
                   10.0.0.7 10.0.0.8
                   10.0.0.9 10.0.0.10
```

If you do not include the **additional** keyword, the IP addresses will replace any previously configured IP addresses:

```
DD(config)# ip host big.foo.com 10.0.0.1 10.0.0.2 10.0.0.3 10.0.0.3 10.0.0.4 10.0.0.5
10.0.0.6 10.0.0.7 10.0.0.8
DD(config)# ip host big.foo.com 10.0.0.9 10.0.0.10
DD(config)# exit
DD# show host big.foo.com
Host                Flags          Age Type  Address(es)
big.foo.com         (perm, OK)    0   IP    10.0.0.9 10.0.0.10
```

Verifying Per-Hostname TTL

To verify the TTL value configured for a host name, use the **show ip director hosts** command:

```
DD> show ip director hosts
Host www.foo.com (MX queries):
Using access-lists to choose servers for selection
TTL for DNS replies is 5
Servers:
  Server 10.0.0.1:
    Advertised 0 times, last at 00:00:00
    Default access-group:1
    Corresponding DRP agent is 10.0.0.1
  Server 10.0.0.2:
    Advertised 0 times, last at 00:00:00
    Corresponding DRP agent is 10.0.0.2
Host specific priorities:
random = 1
```

Viewing DistributedDirector Debugging Messages

To view DistributedDirector debugging messages, use the following commands:

Command	Purpose
Router# debug ip director	Shows debugging information for the DistributedDirector.
Router# debug ip director queries	Shows debugging information for DRP queries the DistributedDirector sends out.
Router# debug ip director sort	Shows debugging information for DistributedDirector IP address sorting.

Configuration Examples

This section provides the following configuration examples:

- Support for DNS Mail Exchange Records
- Policy Redirection
- Unlimited Number of IP Addresses per Virtual Host Name
- Per-Host Name TTL

Support for DNS Mail Exchange Records

When configured as follows, the DistributedDirector will randomly select one of the two MX sites and return an MX response when it receives an MX query for “mail.foo.com.”

```
ip host mail.foo.com mx 10 mail.foo.com
ip host mail.foo.com mx 20 mail2.foo.com
ip host mail1.foo.com 10.0.0.1
ip host mail2.foo.com 10.0.0.2
!
ip director host mail.foo.com mx priority random 1
```

Policy Redirection

When you add the following configuration to the “Support for DNS Mail Exchange Records” configuration, the DistributedDirector will accept MX queries for host names beginning with www. Server 10.0.0.1 will accept only queries from clients on the 10.0.0.0 subnet mask. Server 10.0.0.2 does not have an access list configured, so it will accept any queries.

```
access list 1 permit 10.0.0.0 0.255.255.255
!
ip director server 10.0.0.1 access-group 1
ip director host mx mail.foo.com mx access-control
```

Unlimited Number of IP Addresses per Virtual Host Name

The following configuration associates IP addresses 192.168.10.1 through 192.168.10.10 with the virtual host name, www.foo.org.

```
ip host www.foo.org additional 192.168.10.1 192.168.10.2 192.168.10.3 192.168.10.4
192.168.10.5 192.168.10.6 192.168.10.7 192.168.10.8 192.168.10.9 192.168.10.10
```

Per-Host Name TTL

When configured as follows, the TTL values for DNS resource records generated by the DistributedDirector will be 30 seconds for www.foo.com and 60 seconds for ftp.foo.com.

```
ip director host www.foo.com ttl 30
ip director host ftp.foo.com ttl 60
```

Command Reference

This section documents new or modified commands. All other commands used with this feature are documented in the “Command Summary and Reference” chapters of the publications:

- *Cisco DistributedDirector 2500 Series Install and Config Guide*
- *Cisco DistributedDirector 4700-M Install and Config Guide*
- **ip director host**
- **ip director host access-control**
- **ip director host connect**
- **ip director host drp-med**
- **ip director host drp-rtt**
- **ip director host port-service**
- **ip director host priority**
- **ip director host ttl**
- **ip director server access-group**
- **ip host**
- **ip host mx**

ip director host

To define the virtual host name to be used for the distributed servers, use the **ip director host** global configuration command. To remove the virtual host name, use the **no** form of this command.

ip director host *hostname* [**a** | **mx**]

no ip director host *hostname* [**a** | **mx**]

Syntax Description

<i>hostname</i>	The name of the virtual host. Do not use an IP address.
a	(Optional) Indicates the configuration is for processing Domain Name System (DNS) address (A) queries for the specified host name. If no query type is specified, a is set by default.
mx	(Optional) Indicates the configuration is for processing Mail eXchange (MX) queries for the specified host name.

Defaults

No virtual host name is defined.

The default query type is **a**.

Command Modes

Global configuration

Command History

Release	Modification
11.1(1)IA	This command was introduced.
11.1(25)IA and 12.0(3)T	The a and mx keywords were added.

Examples

Following is an example of this command:

```
DD(config)# ip director host www.sleet.com
```

Related Commands

Command	Description
ip host	Defines a static host name-to-address mapping in the host cache.

ip director host access-control

To use the configured access lists for selecting IP addresses for a virtual host name, use the **ip director host access-control** global configuration command. To disable use of access lists, use the **no** form of this command.

ip director host [a | mx] hostname access-control

no ip director host [a | mx] hostname access-control

Syntax Description

a	(Optional) Indicates the configuration is for processing DNS address (A) queries for the specified host name. If no query type is specified, a is set by default.
mx	(Optional) Indicates the configuration is for processing Mail eXchange (MX) queries for the specified host name.
<i>hostname</i>	The name of the virtual host. Do not use an IP address.

Defaults

Disabled
The default query type is **a**.

Command Modes

Global configuration

Command History

Release	Modification
11.1(25)IA and 12.0(3)T	This command was introduced.

Examples

The following example enables access lists when receiving queries from `www.hacks.org`:

```
ip director host www.hacks.org access-control
```

Related Commands

Command	Description
ip director server access-group	Assigns an access list to a DistributedDirector server.

ip director host connect

To enable the DistributedDirector to verify that a server is available, use the **ip director host connect** global configuration command. The DistributedDirector redirects clients only to servers that respond. To turn off connection parameters, use the **no** form of this command.

ip director host [**a** | **mx**] *hostname* [**mx**] **connect** *port* [**interval**] *connection-interval*

no ip director host [**a** | **mx**] *hostname*

Syntax Description

a	(Optional) Indicates the configuration is for processing DNS address (A) queries for the specified host name. If no query type is specified, a is set by default.
mx	(Optional) Indicates the configuration is for processing Mail eXchange (MX) queries for the specified host name.
<i>hostname</i>	The name of the host that maps to one or more IP addresses. Do not use an IP address.
mx	(Optional) Specifies that the list of MX site addresses will be verified instead of the IP addresses associated with the host name.
<i>port</i>	The port number to which the distributed servers are configured.
interval	(Optional) Configures the connection interval to be a time in seconds instead of minutes.
<i>connection-interval</i>	The time in minutes (or seconds, if the interval keyword is used) that elapses between availability checks.

Defaults

No connection parameter is set.

The default query type is **a**.

Command Modes

Global configuration

Command History

Release	Modification
11.1(1)IA	This command was introduced.
11.1(25)IA and 12.0(3)T	The mx keyword was added.

Usage Guidelines

When this parameter is configured, the DistributedDirector will attempt to create a TCP connection to each of the distributed servers on a configured port (for example, port 80 for HTTP servers) over the configured time interval. Servers that yield unsuccessful TCP connection attempts will be

marked as unavailable. Following a failed TCP connection, the DistributedDirector uses a linear backoff algorithm to create subsequent TCP connections to the server to determine when it is again available. This algorithm is used to smoothly handle changes in server or network availability.

The initial connection trial to a server that is labeled as “up” is done three times in rapid succession. If no connection is successful, the percentage confidence that the server is down is set to 10 percent. The retry interval is calculated as the configured interval multiplied by the confidence percentage with a minimum of 1 minute. Each successive connection attempt is done once, and each time the attempt is unsuccessful the confidence percentage is incremented by 10 percent until it reaches 100 percent.

Note Although TCP connection state information may take up to 4 minutes to be cleared, TCP connection timeouts usually occur within about 30 seconds. As a result, the minimum configurable TCP connection time interval on the DistributedDirector is 1 minute. The minimum retry interval in the linear-backoff algorithm of the DistributedDirector is also 1 minute.

Examples

The following example sets the connect interval to 5 minutes to the distributed servers on port 80:

```
ip director host www.sleet.com connect 80 5
```

Related Commands

Command	Description
ip director host priority	Configures the order in which the DistributedDirector considers metrics when picking a server.

ip director host drp-med

To enable Multiple Exit Discriminator (MED) usage in sorting, use the **ip director host drp-med** global configuration command. To disable MED usage, use the **no** form of this command.

ip director host [a | mx] hostname drp-med

no ip director host [a | mx] hostname drp-med

Syntax Description

a	(Optional) Indicates the configuration is for processing DNS address (A) queries for the specified host name. If no query type is specified, a is set by default.
mx	(Optional) Indicates the configuration is for processing Mail Exchange (MX) queries for the specified host name.
<i>hostname</i>	The name of the virtual host. Do not use an IP address.

Defaults

MED usage is disabled. The default query type is **a**.

Command Modes

Global configuration

Command History

Release	Modification
11.1 IA	This command was introduced.
11.1(25)IA and 12.0(3)T	The mx keyword was added.

Usage Guidelines

When the **drp-med** option is enabled, you must also configure **drp-int** and **drp-ext**.

Related Commands

Command	Description
ip director default-weights	Configures default weight metrics for the DistributedDirector.
ip director host priority	Configures the order in which the DistributedDirector considers metrics when picking a server.
ip director host weights	Sets host-specific weights for the metrics the DistributedDirector used to pick the best server for a specific virtual host name.
ip director server drp-association	Associates a distributed server with its DRP server agent.
ip drp access-group	Enables an access list for DRP on the DistributedDirector.
ip drp authentication key-chain	Configures MD5 authentication for DRP on the DistributedDirector.
ip drp server	Enables DRP on the DistributedDirector.

ip director host drp-rtt

To set a tolerance percentage for the round-trip time metric, use the **ip director host drp-rtt** global configuration command. To restore the default, use the **no** form of this command.

ip director host [**a** | **mx**] *hostname* **drp-rtt tolerance percent rttprobes number**

no ip director host [**a** | **mx**] *hostname* **drp-rtt tolerance percent rttprobes number**

Syntax Description

a	(Optional) Indicates the configuration is for processing DNS address (A) queries for the specified host name. If no query type is specified, a is set by default.
mx	(Optional) Indicates the configuration is for processing Mail Exchange (MX) queries for the specified host name.
<i>hostname</i>	The name of the virtual host. Do not use an IP address.
tolerance percent	Tolerance percentage, expressed as an integer. Range is 0 to 100.
rttprobes number	Number of round-trip time probes Director Response Protocol(DRP) agent uses for the drp-rtt measurements. Range is 0 to 100.

Defaults

A tolerance value of 10 percent is used.

The default query type is **a**.

Command Modes

Global configuration

Command History

Release	Modification
11.1 IA	This command was introduced.
11.1(25)IA and 12.0(3)T	The mx keyword was added.

Usage Guidelines

The tolerance value is 0 to 100 and denotes a tolerance percentage. For example, suppose the tolerance value is set to 20 and there are three DRP agents (DRP1, DRP2, and DRP3) that return a round-trip time of 100 milliseconds, 119 ms, and 125 ms, respectively. Also assume that the **drp-rtt** metric is given highest priority.

Then, DRP1 and DRP2 will be considered the same as far as the round-trip time metric goes because the round-trip time of DRP2 is within 20 percent of the minimum round-trip time of DRP1. But DRP3 will be eliminated from the sorting because its round-trip time is 25 percent more than that of DRP1.

Examples

The following example defines a virtual host name and sets a tolerance of 40 percent:

```
ip director host www.sleet.com drp-rtt tolerance 40 rttprobes 10
```

Related Commands

Command	Description
ip director server drp-association	Associates a distributed server with its DRP server agent.
ip drp access-group	Enables an access list for DRP on the DistributedDirector.
ip drp authentication key-chain	Configures MD5 authentication for DRP on the DistributedDirector.
ip drp server	Enables DRP on the DistributedDirector.

ip director host port-service

To associate a port number with a DistributedDirector host, use the **ip director host port-service** global configuration command. To restore the default, use the **no** form of this command.

ip director host [**a** | **mx**] *hostname* **port-service** *portnumber*

no ip director host [**a** | **mx**] *hostname* **port-service** *portnumber*

Syntax Description

a	(Optional) Indicates the configuration is for processing DNS address (A) queries for the specified host name. If no query type is specified, a is set by default.
mx	(Optional) Indicates the configuration is for processing Mail Exchange (MX) queries for the specified host name.
<i>hostname</i>	The name of the host. Do not use an IP address.
<i>portnumber</i>	Port number to be associated with the host.

Defaults

No ports are associated.

The default query type is **a**.

Command Modes

Global configuration

Command History

Release	Modification
11.1 IA	This command was introduced.
11.1(25)IA and 12.0(3)T	The mx keyword was added.

Usage Guidelines

This command associates a port number with a DistributedDirector host for the purpose of retrieving TCP connection status (if regular connections are being made to verify remote server availability) or other per-service or per-port information, such as administrative preference or the portion metric. If this command has not been configured, then the port specified with the **ip director host connect** command is used.

Related Commands

Command	Description
ip director host connect	Enables the DistributedDirector to verify that a server is available.

ip director host priority

To configure the order in which the DistributedDirector considers metrics when picking a server, use the **ip director host priority** global configuration command. To turn off metric priorities, use the **no** form of this command.

```
ip director host [a | mx] hostname priority {[drp-ser n] [drp-int n] [drp-ext n] [drp-rtt n] [portion n] [random n] [admin n] }
```

```
no ip director host hostname [a | mx] priority [drp-ser] [drp-int] [drp-ext] [drp-rtt] [portion] [random] [admin]
```

Syntax Description

<i>hostname</i>	The name of the host that maps to one or more IP addresses. Do not use an IP address.
a	(Optional) Indicates the configuration is for processing DNS address (A) queries for the specified host name. If no query type is specified, a is set by default.
mx	(Optional) Indicates the configuration is for processing Mail eXchange (MX) queries for the specified host name.
drp-ser <i>n</i>	Director Response Protocol (DRP) server metric. Range is 1 to 100. Sends a DRP request to all DRP server agents, asking them for the Interior Gateway Protocol (IGP) route metric between them and the distributed server(s) that they support. This distance can be used with the DRP-internal metric (drp-int) in order to get a finer distance calculation between the distributed servers and edge of the BGP autonomous system in the direction of the client originating the DistributedDirector query. If a true BGP border router is used as a DRP server agent, the DRP server metric will return the IGP route metric between the distributed server and the BGP border router (autonomous system edge). Because DRP-server metrics should not change frequently, DistributedDirector issues DRP-server queries (and caches the results) every 10 minutes.
drp-int <i>n</i>	DRP internal metric. Range is 1 to 100. Sends a DRP request to all DRP server agents, asking them for the distance from themselves to the edge of their BGP autonomous system in the direction of the client originating the DNS query. This distance can be used along with the DRP external metric to help determine the distance between the router and the client originating the DNS query. If the client and the DRP server agent are in the same autonomous system, this metric returns the IGP cost metric between the client and the DRP server agent. This metric should be configured when the drp-med option is enabled.

- drp-ext *n*** DRP to external metric. Range is 1 to 100.

Sends a DRP request to all DRP server agents, asking them for the BGP distance between them and the client originating the DNS query. This distance represents the number of BGP hops between the autonomous system of the DRP server agent and the autonomous system of the client originating the DNS query. Because this is BGP information, the DRP server agents need to have access to full Internet BGP information for this metric to be useful.
- drp-rtt *n*** DRP round-trip time metric. Range is 1 to 100.

Sends a DRP request to all DRP server agents, asking them for the round-trip time between the DRP agent and the client originating the DNS query.
- portion *n*** Portion metric. Range is 1 to 100.

Assigns a load “portion” to each server such that servers with a higher “portion” value will receive a larger percentage of connections at any one time.
- random *n*** Random metric. Range is 1 to 100.

Selects a random number for each distributed server and defines the “best” server as the one with the smallest random number assignment. Using this metric alone results in random redirection of clients to the distributed servers. Because this metric requires no routing table information, it does not trigger DRP requests to the DRP server agents.
- admin *n*** Administrative metric. Range is 1 to 100.

Specifies a simple preference of one server over another. If the administrative metric has been explicitly set to zero, the Director will not consider the server, so the server is taken out of service.

Defaults

No priority parameter is set.
The default query type is **a**.

Command Modes

Global configuration

Command History

Release	Modification
11.1(1)IA	This command was introduced.
11.1(25)IA and 12.0(3)T	The mx keyword was added.

Usage Guidelines

Not all of the metrics need to be specified, but at least one must be specified.

If multiple servers end up with the same metric value, the next metric is considered to determine the “best” server. If multiple metrics have the same priority value, the metrics are added to obtain a *composite metric*. For example, if two metrics have the same priority value, they are first multiplied by their weight values (if specified) and then added to form the composite metric.

If you do not specify weights for a group of distributed servers, there are no default weights for the Director, if you have specified priority values, the weight values are set to 1.

Any metrics that have a nonzero weight and are assigned no priority value are set to a priority value of 101. They are considered after all other metrics that have priority values. As a result, if no priority values are specified for any metrics, metrics are treated additively to form one composite metric.

If you do not use priority and multiple servers have the same metric value, the server whose last IP address was looked at will be returned as the “best” server. If you want to return a random IP address in the case of a tie, use metric priority with the **random** metric as the last criterion.

To turn off all priorities on all metrics associated with this host name, use the **no ip director host name priority** command. You can turn off the priority for a specific metric or metrics using the **no ip director host name priority [drp-ser] [drp-int] [drp-ext] [drp-rtt] [portion] [random] [admin]** command.

Examples

The following example sets the external metric as the first priority and the administrative priority as the second:

```
ip director host www.sleet.com priority drp-ext 1 admin 2
```

Related Commands

Command	Description
ip director host connect	Enables the DistributedDirector to verify that a server is available.
show ip director host	Displays the DistributedDirector host information.

ip director host ttl

To specify the TTL value of resource records generated by the DistributedDirector for individual virtual host names, use the **ip director host ttl** global configuration command. To return to the default TTL value of zero, use the **no** form of this command.

ip director host [**a** | **mx**] *hostname* **ttl** *seconds*

no ip director host [**a** | **mx**] *hostname* **ttl**

Syntax Description

a	(Optional) Indicates the configuration is for processing DNS address (A) queries for the specified host name. If no query type is specified, a is set by default.
mx	(Optional) Indicates the configuration is for processing Mail eXchange (MX) queries for the specified host name.
<i>hostname</i>	The name of the virtual host. Do not use an IP address.
<i>seconds</i>	TTL value in seconds.

Defaults

The default TTL is zero.

The default query type is **a**.

Command Modes

Global configuration

Command History

Release	Modification
11.1(25)IA and 12.0(3)T	This command was introduced.

Examples

The following example sets the TTL values for DNS resource records generated by the DistributedDirector to 30 seconds for www.foo.com and 60 seconds for ftp.foo.com.

```
ip director host www.foo.com ttl 30
ip director host ftp.foo.com ttl 60
```

ip director host weights

To set host-specific weights for the metrics the Director used to determine the best server within a specific virtual host name, use the **ip director host weights** global configuration command. To turn off weights for a host, use the **no** form of this command.

```
ip director host [a | mx] hostname weights {[drp-ser n] [drp-int n] [drp-ext n] [random n] [admin n]}
```

```
no ip director host [a | mx] hostname weights [drp-ser] [drp-int] [drp-ext] [random] [admin]
```

Syntax Description

a	(Optional) Indicates the configuration is for processing DNS address (A) queries for the specified host name. If no query type is specified, a is set by default.
mx	(Optional) Indicates the configuration is for processing Mail eXchange (MX) queries for the specified host name.
<i>hostname</i>	The name of the host that maps to one or more IP addresses. Do not use an IP address.
drp-ser <i>n</i>	DRP server metric. Range is 1 to 100. Sends a DRP request to all DRP server agents, asking them for the IGP route metric between them and the distributed server(s) that they support. This distance can be used with the DRP-internal metric (drp-int) in order to get a finer distance calculation between the distributed servers and edge of the BGP autonomous system in the direction of the client originating the DistributedDirector query. If a true BGP border router is used as a DRP server agent, the DRP-server metric (drp-ser) will return the IGP route metric between the distributed server and the BGP border router (autonomous system edge). Because DRP-server metrics should not change frequently, DistributedDirector issues DRP-server queries (and caches the results) every 10 minutes.
drp-int <i>n</i>	DRP internal metric. Range is 1 to 100. Sends a DRP request to all DRP server agents, asking them for the distance from themselves to the edge of their BGP autonomous system in the direction of the client originating the DNS query. This distance can be used along with the DRP-external metric to help determine the distance between the router and the client originating the DNS query. If the client and the DRP server agent are in the same autonomous system, this metric returns the IGP cost metric between the client and the DRP server agent.
drp-ext <i>n</i>	DRP to external metric. Range is 1 to 100. Sends a DRP request to all DRP server agents, asking them for the BGP distance between them and the client originating the DNS query. This distance represents the number of BGP hops between the autonomous system of the DRP server agent and the autonomous system of the client originating the DNS query. Because this metric is BGP information, the DRP server agents need to have access to full Internet BGP information for this metric to be useful.

- random *n*** Random metric. Range is 1 to 100.
Selects a random number for each distributed server and defines the “best” server as the one with the smallest random number assignment. Using this metric alone results in random redirection of clients to the distributed servers. Because this metric requires no routing table information, it does not trigger DRP requests to the DRP server agents.
- admin *n*** Administrative metric. Range is 1 to 100.
Specifies a simple preference of one server over another. If the administrative metric has been explicitly set to zero, the Director will not consider the server, so the server is taken out-of-service.

Defaults

No host weights are set. If the **ip director default-weights** command is configured, then those weights are the default.

The default query type is **a**.

Command Modes

Global configuration

Command History

Release	Modification
11.1(1)IA	This command was introduced.
11.1(25)IA and 12.0(3)T	The mx keyword was added.

Usage Guidelines

Use host-specific weights when you want to use different metric weights for different virtual host names (for example, `www.sleet.com` and `ftp.sleet.com`).

If desired, host-specific weights can instead be configured on the Director’s default DNS server.

For example, you could configure host-specific weights with the following DNS TXT record:

```
hostname in txt "ciscoDD: weights {[drp-int n] [drp-ext n] [drp-ser n] [random n] [admin n]}"
```

To use the default weights for all metrics associated with this host name, use the command **no ip director host *name* weights**. To use the default weights for a specific metric or metrics use the **no ip director host *name* weights [drp-ser] [drp-int] [drp-ext] [random] [admin]** command.

Example

Following is an example of this command:

```
DD(config)# ip director host www.sleet.com weights drp-int 4
```

Related Commands

Command	Description
ip director default-weights	Configures default weight metrics for the DistributedDirector.
show ip director host	Displays the DistributedDirector host information.

ip director server access-group

To assign an access list to a DistributedDirector server, use the **ip director server access-group** global configuration command. To remove the access list from the DistributedDirector, use the **no** form of this command.

ip director server *ip-address* [*port-number*] **access-group** *list-number*

no ip director server *ip-address* [*port-number*] **access-group** [*list-number*]

Syntax Description

<i>ip-address</i>	IP address that the access list is to be associated with.
<i>port-number</i>	The port number to which the distributed servers are configured.
<i>list-number</i>	Number of the access list.

Defaults

Disabled

Command Modes

Global configuration

Command History

Release	Modification
11.1(25)IA and 12.0(3)T	This command was introduced.

Examples

The following example associates IP address 192.168.96.1 with access group 1:

```
ip director server 192.168.96.1 access-group 1
```

Related Commands

Command	Description
ip director host access-control	Uses the configured access lists for selecting IP addresses for a virtual host name.

ip host

To define a static host name-to-address mapping in the host cache, use the **ip host** global configuration command. To remove the name-to-address mapping, use the **no** form of this command.

```
ip host hostname [additional] [tcp-port-number] address1 [address2...addressN]
```

```
no ip host hostname address
```

Syntax Description

<i>hostname</i>	Name of the host. The first character can be either a letter or a number. If you use a number, the operations you can perform are limited.
additional	(Optional) Specifies that the IP addresses are to be appended to any IP addresses that are already configured for the host name.
<i>tcp-port-number</i>	(Optional) TCP port number to connect to when using the defined host name in conjunction with an EXEC connect or Telnet command. The default is Telnet (port 23).
<i>address1</i>	Associated IP address.
<i>address2...addressN</i>	(Optional) Additional associated IP address. If you want to bind up more than eight IP addresses to a host name, you must use the additional keyword.

Defaults

Disabled

Command Modes

Global configuration

Command History

Release	Modification
11.1(1)IA	This command was introduced.
11.1(25)IA and 12.0(3)T	The additional keyword was added.

Usage Guidelines

The first character can be either a letter or a numeral. If you use a numeral, the operations you can perform (such as **ping**) are limited.

If you use the **additional** keyword, the IP addresses will be appended to any IP addresses that are already configured for the host name. If you do not use the **additional** keyword, the IP addresses will replace any IP addresses that are already configured for the host name.

Examples

The following example defines three distributed servers as members of the www.sleet.com domain:

```
ip host www.sleet.com 10.0.0.2 11.0.0.2 12.0.0.2
```

ip host mx

To configure host names to be used for DNS MX queries, use the **ip host mx** global configuration command. To remove the name-to-address mapping, use the **no** form of this command.

```
ip host hostname mx preference target-hostname  
no ip host hostname mx [preference] [target-hostname]
```

Syntax Description

<i>hostname</i>	host name that queries will be sent to. The first character can be either a letter or a number. If you use a number, the operations you can perform are limited.
mx	Indicates the configuration is for processing MX queries for the specified host name
<i>preference</i>	Sets this target host names preference.
<i>target-hostname</i>	host name that DNS MX queries will be routed to.

Defaults

Disabled

Command Modes

Global configuration

Command History

Release	Modification
11.1(25)IA and 12.0(3)T	This command was introduced.

Examples

The following example enables the DistributedDirector to randomly select one of the two MX sites and return an MX response when it receive an MX query for “mail.foo.com:”

```
ip host mail.foo.com mx 10 mail.foo.com  
ip host mail.foo.com mx 20 mail2.foo.com  
ip host mail1.foo.com 10.0.0.1  
ip host mail2.foo.com 10.0.0.2  
!  
ip director host mail.foo.com mx priority random 1
```