DistributedDirector Enhancements

Feature Summary

The DistributedDirector and Director Response Protocol (DRP) now support additional traffic redirection criteria. In addition to making redirection decisions based on client-to-server topological proximity using DRP, random distribution, and administrative preferences, the DistributedDirector now supports the DRP-MED option, the DRP-RTT metric, the "portion" metric, and the DRP-RTT Tolerance parameter:

- DRP-MED option: This configuration option enables the DistributedDirector to include the Border Gateway Protocol (BGP) Multiple Exit Discriminator (MED) attribute in traffic redirection decisions.

  When this option is configured, the DistributedDirector gathers the following information from the DRP server agents: BGP MED value for client's network prefix, autonomous system (AS) number associated with each DRP server agent, and IP address of AS exit point for each DRP server agent. The Director determines whether or not any of the DRP server agents (and thus, mirrored IP services) are located in the same AS. If no two servers are in the same AS, regular address sorting proceeds with other configured metrics. If two or more servers are on the same AS, the Director examines the IP address of the exit point of the DRP server agents located in the same AS to verify that they do not share the same AS exit point. If both DRP server agents share a common AS exit point, regular address sorting proceeds with other configured DRP metrics. If the Agents do not share a common AS exit point, the Director examines the BGP MED values returned by the DRP server agents in the same AS and identifies the preferred AS exit point for the client's network prefix as the BGP next hop with the lower BGP MED value. The distributed server associated with the DRP server agent with the lower BGP MED value is then selected as the best server. The Director then returns the IP address of the selected server to the client.

- DRP-RTT metric: This configuration metric enables the DistributedDirector to include server-to-client (since most data goes from server to client) round-trip times (RTT) (link latency) in traffic redirection decisions.

  — DRP-RTT Tolerance parameter: The tolerance level, expressed as a percentage, identifies the relative range of round-trip times, which should be considered as equal. If no value is explicitly configured, the default is 10 percent.

  When the DRP-RTT metric is configured, the DistributedDirector issues a DRP-RTT query to each DRP server agent. Upon receipt of these queries, each DRP server agent determines the round-trip time (link latency) between itself and the requesting client. The Director can then identify the "best" server as that associated with the DRP server agent returning the lowest round-trip time within a specified tolerance level. Use of the configurable DRP-RTT tolerance parameter enables you to use the metric defined at the next priority, to decide between multiple distributed servers having similar client-to-server round-trip times.

- Portion metric: This configuration metric enables you to assign 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. Portion metric values are assigned to each port of each distributed server. The Director uses these portion metric values to determine the percentage of the current number of requests to give to each server. The default metric value is zero. Since this metric requires no routing table information, it does not trigger DRP requests to the DRP server agents.
- Improved granularity for connection intervals: With the release of Cisco DistributedDirector System Software Release 11.1(18)IA, the Director now supports server availability connection intervals to be configured in units of seconds. Previously, the smallest configurable server availability connection was one minute. The Director now supports server availability connection intervals as small as 10 seconds.
- Multiservice support: The DistributedDirector now enables load distribution of multiple services running on individual dispersed servers.
- HTTP redirect with DNS host name: HTTP redirect mode enables the option of returning fully qualified DNS host names instead of IP addresses in the URL. Previous versions of DistributedDirector system software return to the client the IP address of the target server within the redirected URL. This results in the displaying of an IP address in the URL root on the client web browser. Beginning with release 11.1(18)IA, in HTTP redirect mode, the DistributedDirector can return to the client the DNS host name of the target server in the URL root, instead of an IP address.

  Note that today's web browser applications do not handle HTTP 302 Temporary Redirections as fully specified in the HTTP v1.0 specification. According to the specification:

  — The browser application should always display the originally requested URL root after performing the HTTP status code 302 redirection, and not display the redirected URL root. Indeed, the whole purpose of the 302 Temporary Redirect is to transparently redirect traffic intended for one server to another. Modifying the URL when performing the 302 redirection eliminates this transparency.

  — If an "Add Bookmark" operation is performed immediately after an HTTP status code 302 redirection, the browser should bookmark the originally requested URL root, and not the redirected URL root. This rule serves to ensure that subsequent use of the bookmark will direct requests to the originally requested URL, not the redirected URL.

Benefits

DistributedDirector enhancements provide the following benefits:

- DRP-MED: This configuration option enables customers with multiple servers in an AS to redirect network traffic to the server topologically closest to the preferred AS exit point as advertised with BGP MEDs on a per-client basis. This results in increased load distribution efficiency across multiple distributed servers within multihomed autonomous systems with multiple exit points for the same client IP address.
- DRP-RTT: This configuration metric enables the network administrator to optimize server load distribution based on server-to-client link latency, resulting in maximized end-to-end server access performance.
- Portion metric: This configuration metric enables the network administrator to better tune server load distribution across heterogeneous distributed servers, resulting in better service access performance as seen by clients.

- Improved granularity for connection intervals: The improved server availability granularity enables the Director to more quickly determine, in real-time, whether or not each distributed server is capable of responding to server requests. The ability to make this determination on the scale of seconds results in maximized service availability as seen by clients.
- Multiservice support: This provides a cost-effective way to deploy and distribute multiple IP services, enabling more efficient use of server resources.
- HTTP redirect with DNS host name: Using DNS host names in HTTP redirects enables the client to see the fully qualified hostname of the target server in the URL root. This makes it easier for clients to identify the server to which they have been redirected.

Restrictions

These new features work in conjunction with previously existing DistributedDirector functionality, with the following caveats:

- Use of the DRP-MED option and/or the DRP-RTT metric requires Cisco IOS Software Release 11.1(18)IA or later on all DistributedDirector units.
- Use of the DRP-MED option and/or the DRP-RTT metric requires Cisco IOS Software Release 11.3(2)T or later on all DRP server agents.
- Use of the DRP-MED option requires configuration of the DRP-INT and DRP-EXT metrics.
- The DRP-MED option is not weightable or prioritizable.
- DistributedDirector DRP support in release 11.1(18)IA is not compatible with DRP server agent functionality prior to Release 11.3(2)T.
- If you upgrade DistributedDirector system software to Release 11.1(18)IA or later, you must also upgrade your DRP server agent software to Release 11.3(2)T or later.

Platforms

These features are supported on these platforms:

- DistributedDirector 2501
- DistributedDirector 2502
- DistributedDirector 4700-M

DRP server agent functionality is supported on these router platforms:

- Cisco 2500 series
- Cisco 4000 series (including Cisco 400, 4000-M, 4500, 4500-M, 4700, and 4700-M)
- Cisco 7000 series
- Cisco 7200 series
- Cisco 7500 series

Prerequisites

Use of the DRP-MED option requires simultaneous use of the DRP-INT metric. By default, both the DRP-MED option and the DRP-INT metric are disabled.

Configuration Tasks

This section describes the following tasks:

- Enabling DRP-MED
- Enabling DRP-RTT
- Configuring DRP-Associations, Host-Specific Weights, Priorities, Preferences, and Tolerances in the Director
- Configuring HTTP Redirect with DNS Host Name

Enabling DRP-MED

The DRP-MED option instructs the Director to examine BGP MED values, BGP next hop IP addresses, and AS numbers for DRP server agents to resolve the case of multiple exit points for DRP agents in the same AS. It can neither be assigned a weight nor a priority. Whenever the DRP-MED option is enabled, use of the DRP-INT and DRP-EXT metrics is required.

To enable the **drp-med** option, perform the following task in global configuration mode:

Task	Command
Enable DRP-MED.	**ip director host** *name* **drp-med**

By default, the DRP-MED option is disabled.

Enabling DRP-RTT

To define the default or host-specific weights, perform either of the following tasks in global configuration mode:

Task	Command
Define default weight.	**ip director default-weights** {[**drp-int** *n*] [**drp-ext** *n*] [**drp-ser** *n*] [**drp-rtt** *n*] [**random** *n*] [**admin** *n*] [**portion** *n*]}
Define host-specific weights.	**ip director host** *name* **weights** {[**drp-int** *n*] [**drp-ext** *n*] [**drp-ser** *n*] [**drp-rtt** *n*] [**random** *n*] [**admin** *n*] [**portion** *n*]}

To define the DRP-RTT metric prioritization, perform the following task in global configuration mode:

Task	Command
Define round-trip time metric prioritization.	**ip director host** *name* **priority** {[**drp-int** *n*] [**drp-ext** *n*] [**drp-ser** *n*] [**drp-rtt** *n*] [**random** *n*] [**admin** *n*]}

By default, the **drp-rtt** metric is disabled, as are all other DRP metrics. Like all other DRP metrics, no default priority is assigned to the DRP-RTT metric.

Configuring DRP-Associations, Host-Specific Weights, Priorities, Preferences, and Tolerances in the Director

The tasks associated with these steps are described in the subsections that follow:

Step 1 Add a Start of Authority Record in the Director

Step 2 Associate Each Distributed Server with Its DRP Server Agent (if you intend to configure DRP metrics)

Step 3 Identify the Distributed Servers

Step 4 Associate the DNS Host Name with a Port

Step 5 Specify Information for Server Verification

Step 6 Specify Host-Specific Weights or Metric Priorities

Step 7 Set Up Server Preferences

Step 8 Set Up Tolerances

Add a Start of Authority Record in the Director

Note Start of Authority (SOA) serial numbers are not specified. The Director automatically calculates the SOA serial number each time a resource record is returned. This serial number, obtained from the system clock, is a 32-bit representation of the number of seconds since January 1, 1900. Note that January 1, 1900 is also the start time for the Network Time Protocol (NTP), defined in RFC 1305, which is used by all major Internet sites to synchronize system clocks with atomic clocks worldwide.

Perform the following task in global configuration mode to add a Start of Authority (SOA) record in the Director to define the Director as the authoritative server for the subdomain name associated with the distributed servers:

Task	Command
In the Director, add a Start of Authority (SOA) record that gives the Director authority for the subdomain.	**ip dns primary** *domain* **soa** *primary contact* [*refresh* [*retry* [*expire* [*minimum*]]]]

For example, the following record makes the private DNS server authoritative for the www.sleet.com subdomain:

```
ip dns primary www.sleet.com soa dd.sleet.com sysadmin.sleet.com 21600 900 7776000 86400
```

The above command tells the Director that it is the primary DNS server authoritative for the www.sleet.com domain. It indicates that the DNS host name of the Director is dd.sleet.com, and the administrative contact for this zone is sysadmin@sleet.com.

The refresh-interval (the time interval that must elapse between each poll of the primary by the secondary name server) is 6 hours. A retry-interval (the time interval used between successive connection attempts by the secondary to reach the primary name server in case the first attempt failed) is 15 minutes. The expire-ttl (the time interval after which the secondary expires its data if it cannot reach the primary name server) is 90 days. A minimum-ttl (the minimum time-to-live value, which specifies how long other servers should cache data from the name server) is 1 day.

The values shown are suggested default values. You can configure the Director with the shown default values by simply using the following command:

ip dns primary *domain* **soa** *primary contact*

In the example, you would use the following command:

```
ip dns primary www.sleet.com soa dd.sleet.com sysadmin.sleet.com
```

Associate Each Distributed Server with Its DRP Server Agent

If you intend to configure any DRP metrics, associate each distributed server with its DRP server agent.

Perform the following task in global configuration mode:

Task	Command
Associate each distributed server with its DRP server agent.	**ip director server** {*hostname* | *host-ip-address*} **drp-association** {*name* | *ip-address*}

For example:

```
ip director server 11.0.0.2 drp-association 11.0.0.3
```

The Director will query its default DNS server for name-to-address bindings. If you use host/router names instead of IP addresses, you must make sure to configure the appropriate records in the Director's default DNS server. You should use your primary domain server as the Director's default DNS server to ensure that all such name-to-address binding requests can be satisfied.

Identify the Distributed Servers

Perform the following task in global configuration mode to identify the IP address(es) of the distributed server(s) with a domain name:

Task	Command
Identify the distributed servers.	**ip host** *name* [*tcp-port-number*] *address1* [*address2...address8*]

For example, to identify the distributed servers with IP addresses 10.0.0.2, 11.0.0.2, and 12.0.0.2 as members of the www.sleet.com domain, you would use the following command:

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

Associate the DNS Host Name with a Port

Perform the following task in global configuration mode to associate the DNS host name with a port:

Task	Command
Associate DNS host name with a port.	**ip director host** *name* **port-service**

For example, the following command associates the host www.sleet.com with port 80:

```
ip director host www.sleet.com port-service 80
```

Specify Information for Server Verification

This task is optional. Perform the following task in global configuration mode:

Task	Command
Specify information for server verification.	**ip director host** *name* **connect** *port* **interval** *connection-interval*

For example, you would use the following command to instruct the Director to create a TCP connection to port 80 on each distributed server associated with www.sleet.com every 900 seconds (15 minutes):

```
ip director host www.sleet.com connect 80 interval 900
```

Servers that yield unsuccessful TCP connections are marked as unavailable. Subsequent successful TCP connections to the server will reinstate it as available. See “Specifying the Server Connection Parameter” in the chapter “Configuring Advanced Features” of the DistributedDirector installation and configuration guide for more details.

Specify Host-Specific Weights or Metric Priorities

To specify host-specific weights or metric priorities, perform either or both of the following tasks in global configuration mode:

Task	Command
Specify host-specific weights.	**ip director host** *name* **weights** {[**drp-int** *n*] **[drp-ext** *n*] [**drp-ser** *n*] [**drp-rtt** *n*] [**random** *n*] [**admin** *n*] [**portion** *n*]}
Specify metric priorities.	**ip director host** *name* **priority** {[**drp-int** *n*] [**drp-ext** *n*] [**drp-ser** *n*] [**drp-rtt** *n*] [**random** *n*] [**admin** *n*] [**portion** *n*]}

An example for host-specific weights follows:

```
ip director host www.sleet.com weights drp-ext 80 random 10 admin 10
```

An example for metric priorities follows:

```
ip director host www.sleet.com priority drp-ext 1 admin 2 random 3
```

Because there is no default prioritization, all metrics with nonzero weights are considered at the same time and after all other prioritized metrics. Metric priorities must be explicitly configured.

See the section “Setting Metrics and the Server Connection Parameter” in the chapter “Configuring Advanced Features” in the Cisco DistributedDirector installation and configuration guides for more information.

You might want to configure DRP-associations, host-specific weights, and priorities in the Director’s default DNS server. This may be useful if you use scripting tools to generate and maintain your DNS configurations.

Set Up Server Preferences

To set a preference for a distributed server based on cost, perform the following task in global configuration mode. When sorting, the Director uses the server preference value as that server's administrative (admin) metric.

Task	Command
Assign a preference for a distributed server (host).	**ip director server** {*hostname* | *host-ip-address*} **preference** [*cost*]

For example, to set a preference in the Director for the distributed server www-west.sleet.com, you might use the following command:

```
ip director server www-west.sleet.com preference 50
```

or

```
ip director server 10.0.0.2 preference 50
```

This example makes the www-west.sleet.com host less preferred to others because it has a higher "cost" than the others (a cost of 50 in this case).

Set Up Tolerances

This task is optional. To set tolerances for the round-trip time metric, perform the following task in global configuration mode:

Task	Command
Define the DRP-RTT tolerance.	**ip director host** *name* **drp-rtt tolerance** *percent* **rttprobes** *number*

If no DRP-RTT tolerance value is explicitly configured, the Director will use a default value of 10.

The Director uses the tolerance value to determine, relative to the lowest reported round-trip time, whether or not any distributed servers should be equally preferred for a given client.

As an example, suppose the tolerance value is set to 20 and there are three DRP agents: DRP1, DRP2 and DRP3. Assume that these DRP server agents return round-trip times of 100 ms, 119 ms and 125 milliseconds (ms), respectively. Because the round-trip time associated with DRP2 (119 ms) is within the 20 percent tolerance range relative to the lowest round-trip time reported by DRP1 (100 ms), the Director would consider both distributed servers as equally preferred for the requesting client. The server associated with DRP3 would be eliminated from the sorting because its round-trip time (125 ms) is beyond the 20 percent tolerance range relative to the lowest round-trip time (for example, the round-trip time reported by DRP3 is greater than 1.20 times the lowest reported round-trip time).

Configuring HTTP Redirect with DNS Host Name

To associate a name with a server to be used in the URL returned by the Director in HTTP redirect mode, perform the following task in global configuration mode:

Task	Command
Associate a name with a server to be used in the URL returned by the Director in HTTP redirect mode.	**ip director server** *host* **server-name** *name*

In the following example, the IP addresses are associated with host names:

```
ip director server 11.0.0.1 server-name www-east.sleet.com
ip director server 11.0.0.2 server-name www-west.sleet.com
```

When www.sleet.com is accessed (for example, with a web browser), the host names will appear in the URL instead of their IP addresses.

Configuration Examples

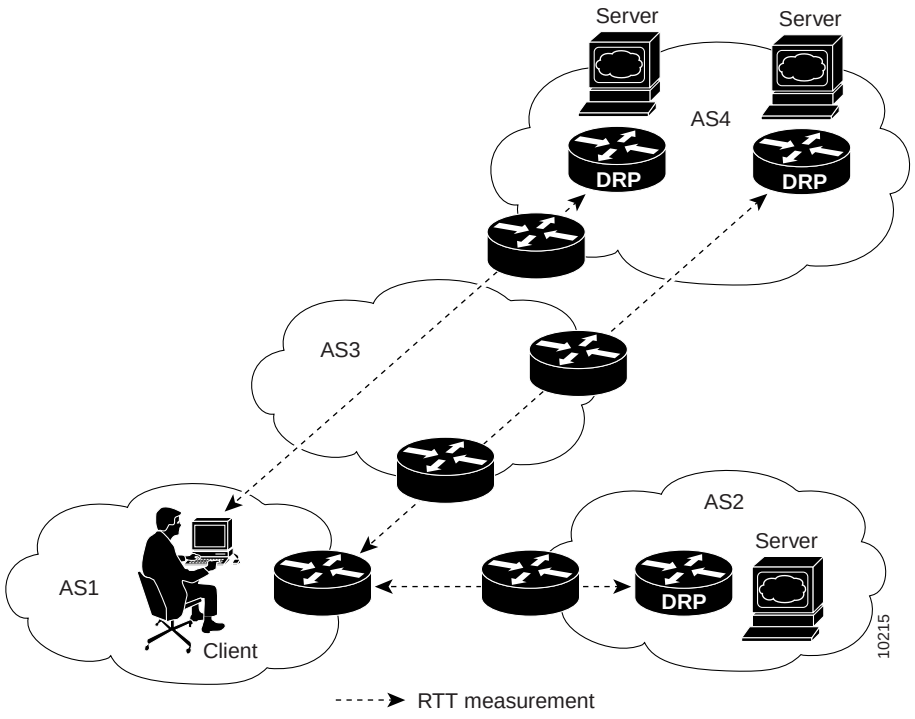
This section illustrates the DistributedDirector enhancements with the following examples:

- DRP-MED Examples
- Portion Metric Example
- DRP-RTT Example
- Multiservice Support Example

DRP-MED Examples

Figure 1 shows four autonomous systems with multiple servers and one DistributedDirector.

Figure 1 Sample Network



Assume that you want to configure the following redirection criteria:

1. Choose the best server based on lowest client-to-server round-trip time with a 20 percent tolerance value.
2. In case of a tie in 1 above, choose the best server based on topological proximity as measured by the number of autonomous system hops between the client and server.
3. In case of a tie in 2 above (in which multiple servers have the same BGP AS hop count from the client), determine whether or not the servers are in the same AS. If they are in the same AS, determine if the AS is multihomed and select the best server as the one whose corresponding DRP agent has a low BGP MED attribute. If they are not in the same AS, select the best server as that topologically closest to its AS exit point in the direction of the requesting client.
4. In case of a tie in 3 above, simply select one of the tied servers randomly.

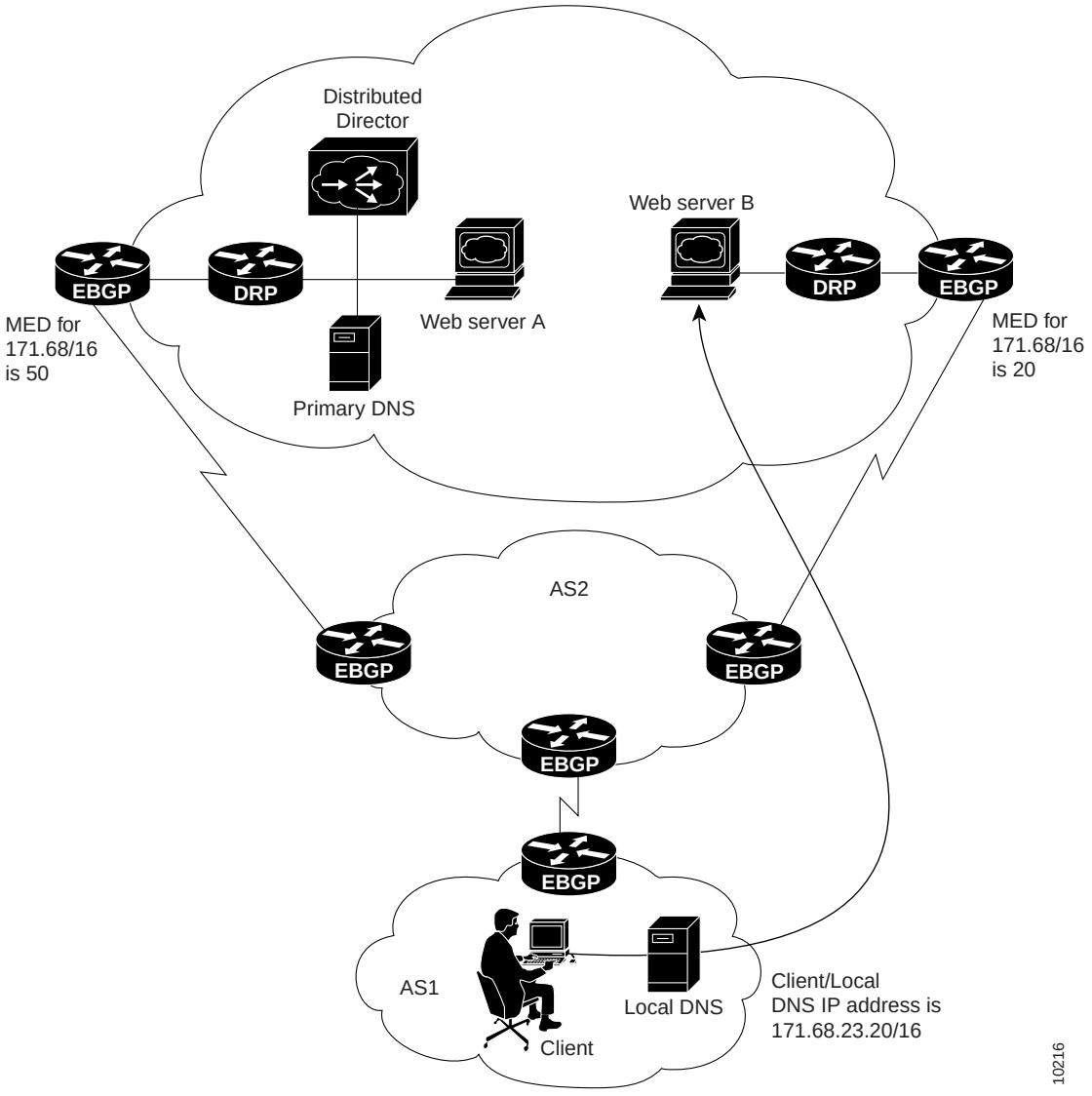
5 Use the Server Availability Parameter for HTTP every 60 seconds.

The following configuration meets the above criteria:

```
ip director host www.sleet.com drp-med
ip director host www.sleet.com drp-rtt tolerance 20
ip director host www.sleet.com weights drp-rtt 1 drp-ext 1 drp-int 1 drp-ser 1 ran 1
ip director host www.sleet.com priority drp-rtt 1 drp-ext 2 drp-int 3 drp-ser 3 ran 4
ip director host www.sleet.com connect 80 1
```

In Figure 2, the Director redirects the client to web server B because this server is topologically closest (as measured by DRP-INTERNAL and DRP-SERVER, if configured) to the AS exit point with the lower BGP MED value for the client network prefix of 171.68/16.

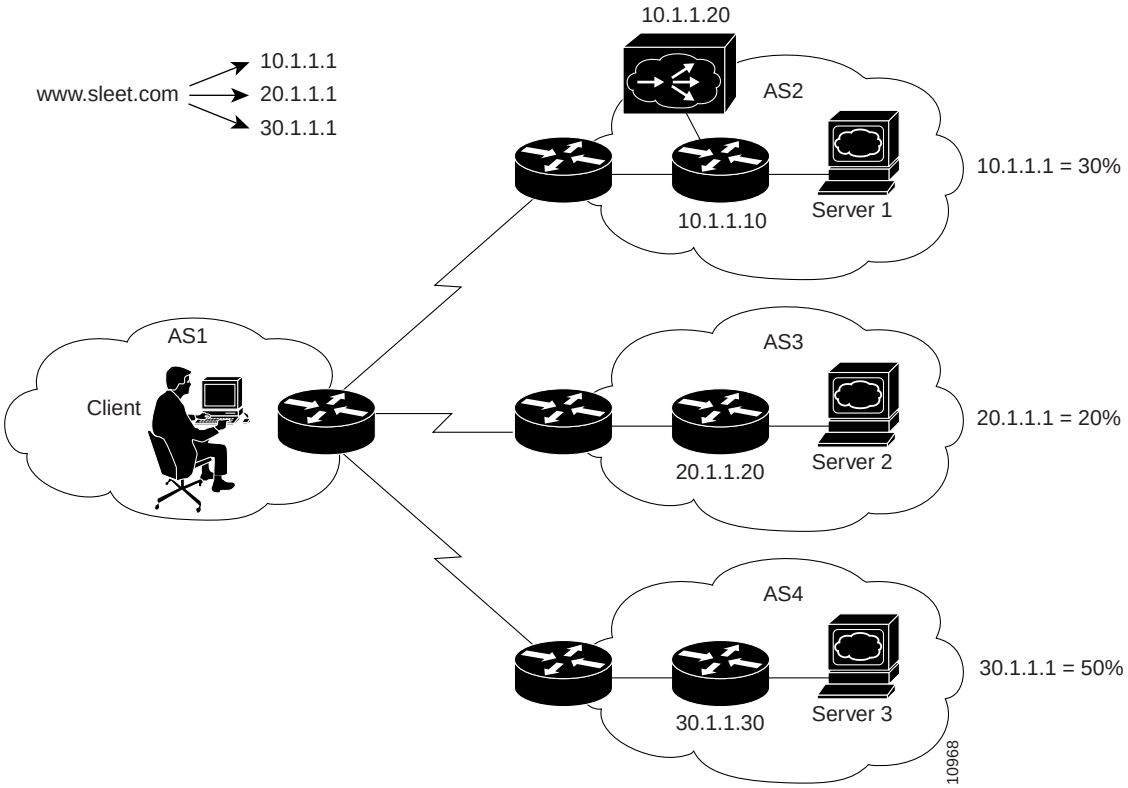
Figure 2 DRP-MED Example



Portion Metric Example

In Figure 3, there are three distributed servers.

Figure 3 Portion Metric Example



In this example, we would like the following to occur:

- Send 30 percent of HTTP traffic to server 10.1.1.1
- Send 20 percent of HTTP traffic to server 20.1.1.1
- Send 50 percent of HTTP traffic to server 30.1.1.1
- Check for server availability every 30 seconds

The sum of all portion values assigned to the servers is 100 (30+20+50). The percentage of connections assigned to each of the three distributed servers is simply the portion metric divided by the sum of all portion metrics. If a new server is added with a portion metric of 15, it would get 15/115 of incoming requests.

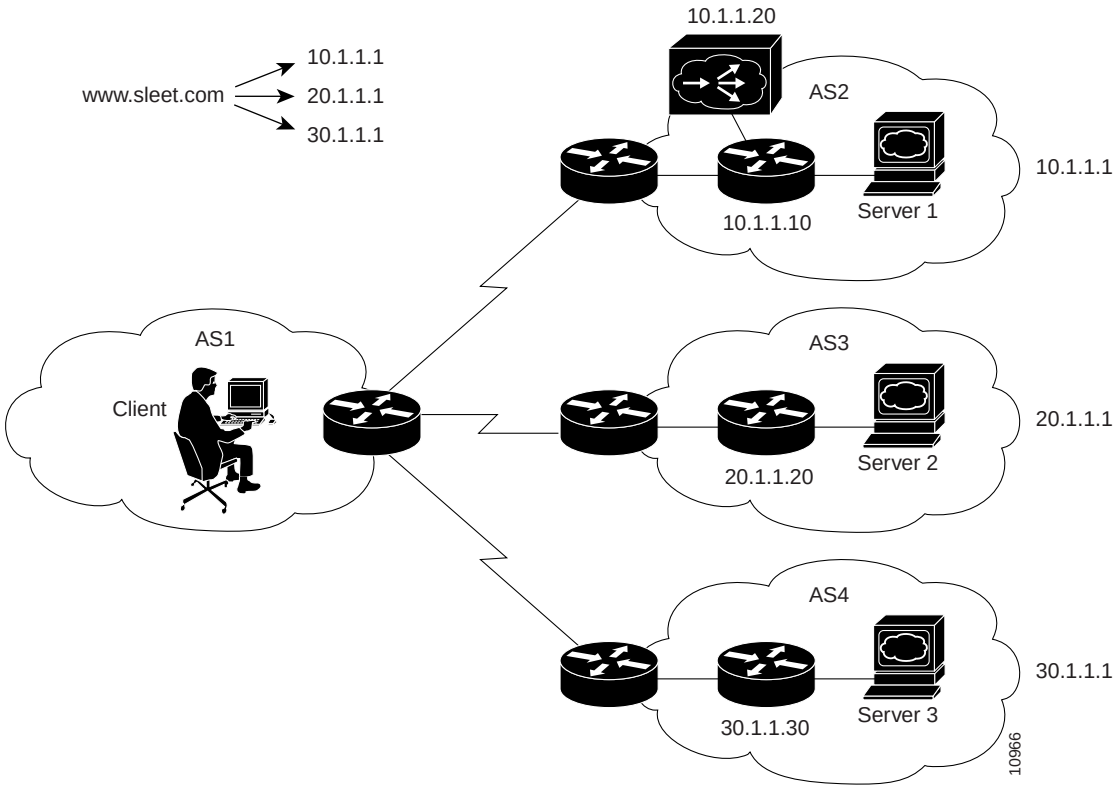
The following configuration assigns portion values to the three servers:

```
interface Ethernet0
 ip address 10.1.1.20 255.255.255.0
ip director host www.sleet.com
ip host www.sleet.com 10.1.1.1 20.1.1.1 30.1.1.1
ip name-server a.b.c.d
ip dns primary www.sleet.com soa dd.sleet.com postmaster.sleet.com
ip director server 10.1.1.1 drp-association 10.1.1.10
ip director server 20.1.1.1 drp-association 20.1.1.20
ip director server 30.1.1.1 drp-association 30.1.1.30
ip director server 10.1.1.1 portion 30
ip director server 20.1.1.1 portion 20
ip director server 30.1.1.1 portion 50
ip director host www.sleet.com connect 80 interval 30
ip director host www.sleet.com priority portion 1
```

DRP-RTT Example

In Figure 4, the DRP-RTT metric is used as the primary metric. In the event of a tie, the random metric is used as the secondary metric.

Figure 4 DRP-RTT Example



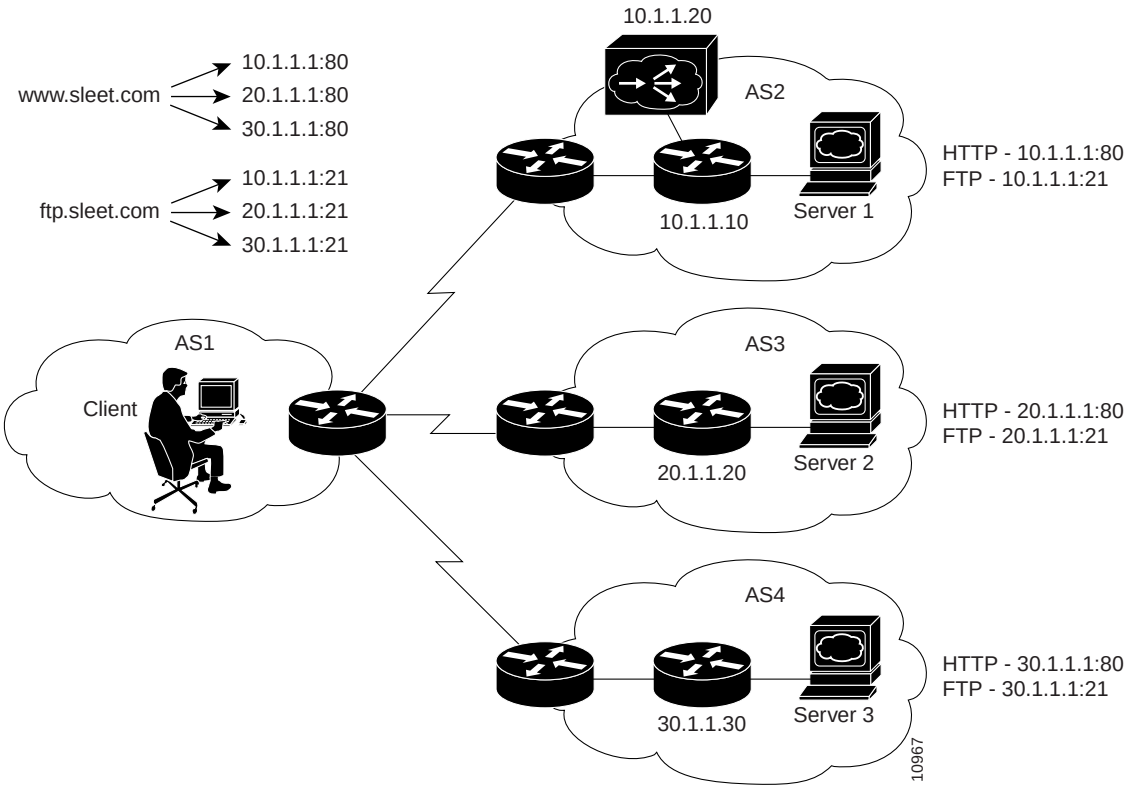
This configuration uses a 15 percent tolerance parameter, uses 1 RTT probe per request, and checks server availability every 30 seconds:

```
interface Ethernet0
 ip address 10.1.1.20 255.255.255.0
ip director host www.sleet.com
ip host www.sleet.com 10.1.1.1 20.1.1.1 30.1.1.1
ip name-server a.b.c.d
ip dns primary www.sleet.com soa dd.sleet.com postmaster.sleet.com
ip director server 10.1.1.1 drp-association 10.1.1.10
ip director server 20.1.1.1 drp-association 20.1.1.20
ip director server 30.1.1.1 drp-association 30.1.1.30
ip director host www.sleet.com drp-rtt tolerance 15
ip director host www.sleet.com connect 80 interval 30
ip director host www.sleet.com priority drp-rtt random 2
```

Multiservice Support Example

In Figure 5, HTTP and FTP traffic is distributed on all servers using the names www.sleet.com and ftp.sleet.com. The DRP-RTT metric is the primary metric, with the random metric as the secondary metric in the event of a tie.

Figure 5 Multiservice Support Example



This configuration uses a 15 percent tolerance parameter, uses three RTT probes per request, and checks HTTP server availability every 30 seconds and FTP server availability every 45 seconds:

```
interface Ethernet0
 ip address 10.1.1.20 255.255.255.0
ip director host www.sleet.com port-service 80
ip director host ftp.sleet.com port-service 21
ip host www.sleet.com 10.1.1.1 20.1.1.1 30.1.1.1
ip host ftp.sleet.com 10.1.1.1 20.1.1.1 30.1.1.1
ip name-server a.b.c.d
ip dns primary www.sleet.com soa dd.sleet.com postmaster.sleet.com
ip dns primary ftp.sleet.com soa dd.sleet.com postmaster.sleet.com
ip director server 10.1.1.1 drp-association 10.1.1.10
ip director server 20.1.1.1 drp-association 20.1.1.20
ip director server 30.1.1.1 drp-association 30.1.1.30
ip director host www.sleet.com drp-rtt tolerance 15
ip director host www.sleet.com drp-rtt rttprobes 3
ip director host www.sleet.com priority drp-rtt 1 random 2
ip director host ftp.sleet.com priority drp-rtt 1 random 2
ip director host www.sleet.com
ip director host connect 80 interval 30
ip director host ftp.sleet.com
ip director host connect 21 interval 45
```

Command Reference

This section documents the following new and modified commands:

- **ip director default-weights**
- **ip director host connect interval**
- **ip director host drp-med**
- **ip director host drp-rtt**
- **ip director host port-service**
- **ip director host priority**
- **ip director host weights**
- **ip director server admin-pref**
- **ip director server connect-interval**
- **ip director server server-name**

All other commands used with this feature are documented in the Cisco IOS Release 11.1 command references or the Cisco DistributedDirector installation and configuration guides.

ip director default-weights

To configure default weight metrics for the Director, use the **ip director default-weights** global configuration command. Use the **no** form of this command to restore the default.

ip director default-weights {[**drp-int** *n*] [**drp-ext** *n*] [**drp-ser** *n*] [**drp-rtt** *n*] [**random** *n*] [**admin** *n*] [**portion** *n*]}
no ip director default-weights

Syntax Description

drp-int *n* — 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 *n* — DRP 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-ser *n* — DRP to 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 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-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.

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.
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.

Default

No default weight are specified.

Command Mode

Global configuration

Usage Guidelines

This command first appeared in Cisco IOS Release 11.1 IA.

Not all of the metrics need to be configured; however, at least one metric must be configured when this command is used.

Default weights are used for all host names sorted by the Director. To override default weights for a certain host, you would specify host-specific weights in the private DNS server configuration.

When the associated metric is referenced in the sorting decision, it will always be multiplied by the appropriate metric weight. In this way, you can specify that some metrics should be weighted more than others. You may determine the weights you want to use through experimentation. The weights given do not need to add up to 100.

Example

The following command configures default weights for the internal and external metrics:

```
ip director default-weights drp-int 10 drp-ext 90
```

Related Commands

debug ip director parse
debug ip director sort
ip director access-list
ip director cache
ip director host priority

ip director host weights
ip director server admin-pref
ip director server preference
ip director server portion
show ip director default-weights
show ip director server

ip director host connect interval

To configure a TCP connection interval, use the **ip director host connect interval** global configuration command. Use the **no** form of this command to restore the default.

ip director host *name* **connect** *port* **interval** *seconds*
no ip director host *name* **connect** *port* **interval** *seconds*

Syntax Description

name	Name of host that maps to one or more IP addresses. Do not use an IP address.
port	Port number.
seconds	Time interval in seconds. Minimum configurable time is 10 seconds.

Default

No connection interval is specified.

Command Mode

Global configuration

Usage Guidelines

This command first appeared in Cisco IOS Release 11.1 IA.

When this parameter is configured, the Director 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.

Example

The following example connects to the remote host www.sleet.com on port 80 every 30 seconds:

```
ip director host www.sleet.com connect 80 interval 30
```

Related Commands

ip director server connect-interval

ip director host drp-med

To enable MED usage in sorting, use the **ip director host drp-med** global configuration command. Use the **no** form of this command to disable MED usage.

ip director host *name* **drp-med**
no ip director host *name* **drp-med**

Syntax Description

name	The name of the virtual host. Do not use an IP address.

Default

MED usage is disabled.

Command Mode

Global configuration

Usage Guidelines

This command first appeared in Cisco IOS Release 11.1 IA.

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

Example

The following example defines a virtual host name and enables MED usage:

```
ip director host www.sleet.com drp-med
```

Related Commands

ip director default-weights
ip director host priority
ip director host weights
ip director server drp-association
ip drp access-group
ip drp authentication key-chain
ip drp server

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. Use the **no** form of this command to restore the default.

ip director host *name* **drp-rtt tolerance** *percent* **rttprobes** *number*
no ip director host *name* **drp-rtt tolerance** *percent* **rttprobes** *number*

Syntax Description

name	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 DRP agent uses for the **drp-rtt** measurements. Range is 0 to 100

Default

A tolerance value of 10 percent is used.

Command Mode

Global configuration

Usage Guidelines

This command first appeared in Cisco IOS Release 11.1 IA.

The tolerance value is between 0 and 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 ms, 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 since its round-trip time is 25 percent more than that of DRP1.

Example

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

ip director server drp-association
ip drp access-group
ip drp authentication key-chain
ip drp server

ip director host port-service

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

ip director host *name* **port-service** *portnumber*

no ip director host *name* **port-service** *portnumber*

Syntax Description

name	The name of the host. Do not use an IP address.
portnumber	Port number to be associated with the host.

Default

No ports are associated.

Command Mode

Global configuration

Usage Guidelines

This command first appeared in Cisco IOS Release 11.1 IA.

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.

Example

The following example associates port 80 with the DistributedDirector host www.sleet.com:

```
ip director host www.sleet.com port-service 80
```

Related Commands

ip director host connect

ip director host priority

To configure the order in which the Director 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 *name* **priority** {[**drp-ser** *n*] [**drp-int** *n*] [**drp-ext** *n*] [**drp-rtt** *n*] [**portion** *n*] [**random** *n*] [**admin** *n*]}
no ip director host *name* **priority** [**drp-ser**] [**drp-int**] [**drp-ext**] [**drp-rtt**] [**portion**] [**random**] [**admin**]

Syntax Description

name	The name of the host that maps to one or more IP addresses. Do not use an IP address.
drp-ser *n*	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 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 *n*	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.

Default

No priority parameter is set.

Command Mode

Global configuration

Usage Guidelines

This command first appeared in Cisco IOS Release 11.1 IA.

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 together 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, and 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 command **no ip director host** *name* **priority**. 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.

Example

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 Command

ip director host connect
show ip director host

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. Use the **no** form of this command to turn off weights for a host.

ip director host *name* **weights** {[**drp-ser** *n*] [**drp-int** *n*] [**drp-ext** *n*] [**drp-rtt** *n*] [**portion** *n*] [**random** *n*] [**admin** *n*]}
no ip director host *name* **weights** [**drp-ser**] [**drp-int**] [**drp-ext**] [**drp-rtt**] [**portion**] [**random**] [**admin**]

Syntax Description

name — The name of the host that maps to one or more IP addresses. Do not use an IP address.

drp-ser *n* — 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 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 *n* — 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 metric 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.

Default

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

Command Mode

Global configuration

Usage Guidelines

This command first appeared in Cisco IOS Release 11.1 IA.

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**] [**drp-rtt**] [**portion**] [**random**] [**admin**] command.

Example

The following example sets the DRP internal metric to 4:

```
ip director host www.sleet.com weights drp-int 4
```

Related Commands

ip director default-weights
show ip director host

ip director server admin-pref

To configure a per-service administrative preference value, use the **ip director server admin-pref** global configuration command. Use the **no** form of this command to restore the default.

ip director server *address port* **admin-pref** *value*
no ip director server *address port* **admin-pref** *value*

Syntax Description

address	IP address.
port	Port number.
value	Range is 1 to 100.

Default

No preference is specified.

Command Mode

Global configuration

Usage Guidelines

This command first appeared in Cisco IOS Release 11.1 IA.

During sorting, the most specific preference configured is used. Therefore, if the **ip director host port-service** command has been configured for the DNS host name in question, then the specific per-service administrative preference value configured would be used for the administrative preference metric. If no per-service administrative preference has been configured for a server, then the preference configured with the **ip director server preference** command would be used.

Example

The following example assigns an administrative preference value of 5 to server 10.0.0.1 on port 80:

```
ip director server 10.0.0.1 80 admin-pref 5
```

Related Commands

ip director host port-service
ip director server preference

ip director server connect-interval

To configure a per-service TCP connection interval, use the **ip director server connect** global configuration command. Use the **no** form of this command to restore the default.

ip director server *address port* **connect-interval** *seconds*
no ip director server *address port* **connect-interval** *seconds*

Syntax Description

address	IP address.
port	Port number to be associated with the host.
seconds	Time interval in seconds. Minimum configurable time is 10 seconds.

Default

No connection interval is specified.

Command Mode

Global configuration

Usage Guidelines

This command first appeared in Cisco IOS Release 11.1 IA.

This is the per-service version of the **ip director host connect** command. If the remote server has a per-service connect interval configured, that information is used when verifying remote server availability. If there is no per-service configuration, then the configuration information from **ip director host connect** is used instead.

Example

The following example connects to the remote server at IP address 10.0.0.1 on port 80 every 30 seconds:

```
ip director server 10.0.0.1 80 connect-interval 30
```

Related Commands

ip director host connect
ip director host connect interval

ip director server server-name

To associate a name with a server to be used in the URL returned by the Director in HTTP redirector mode, use the **ip director server server-name** global configuration command. Use the **no** form of this command to restore the default.

ip director server *host* **server-name** *name*
no ip director server *host* **server-name** *name*

Syntax Description

host	IP address.
name	Name to be associated with the server.

Default

No name is associated with the server.

Command Mode

Global configuration

Usage Guidelines

This command first appeared in Cisco IOS Release 11.1 IA.

When used, this command causes the Director to return a host name in the URL. If this command is not configured, the IP address is used instead.

Example

In the following example, when the Director selects 20.0.0.1 as the server closest to the client, the URL returned will have the host name www-east.sleet.com instead of 20.0.0.1:

```
ip director server 20.0.0.1 server-name www-east.sleet.com
```