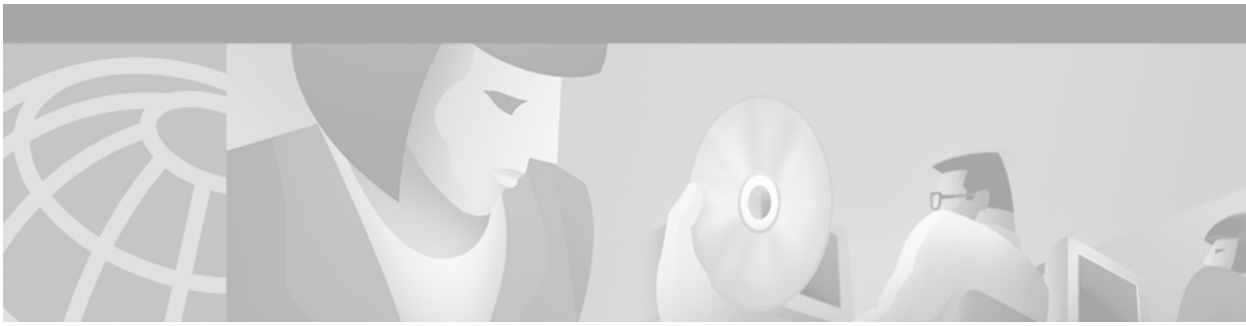

DFP Agent Subsystem

Feature History

Release	Modification
12.1(8a)E	This feature was introduced.
12.2(18)SXD	The following function was added: • Home Agent Director, page 2

This document describes the Dynamic Feedback Protocol (DFP) Agent Subsystem feature in Cisco IOS Release 12.2(18)SXD. It includes the following sections:

- Feature Overview, page 1
- Supported Platforms, page 3
- Supported Standards, MIBs, and RFCs, page 4
- Prerequisites, page 4
- Configuration Tasks, page 4
- Monitoring and Maintaining the DFP Agent Subsystem Feature, page 5
- Configuration Examples, page 5
- Command Reference, page 5
- Glossary, page 17

Feature Overview

The Dynamic Feedback Protocol (DFP) enables a *DFP agent* in a local load-balancing environment to collect status information from one or more real host servers, convert the information to relative weights, and report the weights to a *DFP manager*, such as an IOS Server Load Balancing (SLB) device. The DFP manager factors in the weights when load balancing the real servers. DFP also supports global load-balancing environments, with IOS SLB reporting weights to DistributedDirector. For more information about DFP, see the *IOS Server Load Balancing* feature module.

Prior to 12.1(8a)E, the DFP agent was implemented only in IOS SLB. The new DFP agent subsystem feature enables client subsystems other than IOS SLB to act as DFP agents. However, currently IOS SLB is the only supported subsystem. You can use multiple DFP agents from different client subsystems at the same time.

The DFP Agent Subsystem is bundled with the IOS SLB and GGSN products, it is not available separately.

Home Agent Director

The Home Agent Director load balances Mobile IP Registration Requests (RRQs) among a set of home agents (acting as real servers in a server farm). Home agents are the anchoring points for mobile nodes. Home agents route flows for a mobile node to its current foreign agent (point of attachment).

The Home Agent Director requires DFP in order to allocate RRQs based on capacity.

For more information about the Home Agent Director, refer to the *IOS Server Load Balancing* feature module, release 12.2(18)SXD.

For more information about Mobile IP, home agents, and related topics, refer to the *Cisco IOS IP Configuration Guide*, Release 12.2.

Benefits

The DFP agent subsystem enables client subsystems other than IOS SLB to act as DFP agents, sending weights to a DFP manager.

Restrictions

The DFP agent subsystem has the following restrictions:

- The DFP agent requires a delay between hello messages of at least 3 seconds. Therefore, if your DFP manager provides a timeout specification, you must set the timeout to at least 3 seconds.
- The password specified in the DFP manager must match the password specified on the **password** command in the DFP agent.
- As part of the implementation of the DFP agent subsystem, the **manager (DFP agent)** command has been removed. Its function is now provided by the **ip dfp agent** global configuration command, and by the following DFP agent configuration commands:
  - **inservice (DFP agent)**
  - **interval (DFP agent)**
  - **password (DFP agent)**
  - **port (DFP agent)**

Related Features and Technologies

- IOS Server Load Balancing (IOS SLB)
- Dynamic Feedback Protocol (DFP)
- Mobile IP

Related Documents

- *Cisco IOS IP Configuration Guide, Release 12.2*
- *Cisco IOS IP Command Reference, Volume 1 of 3: Addressing and Services, Release 12.2*
- *Dynamic Feedback Protocol Support in Distributed Director*
- *IOS Server Load Balancing* feature module

Supported Platforms

- Cisco 7100 series routers
- Cisco 7200 series routers
- Cisco Multi-Processor WAN Application Module (MWAM), Multilayer Switch Feature Card 2 (MSFC2), Supervisor Engine 1, and Supervisor Engine 2 for Cisco Catalyst 6500 family switches (including the Catalyst 6506, Catalyst 6509, and Catalyst 6513)
- MWAM, MSFC2, Supervisor Engine 1, and Supervisor Engine 2 for the Cisco 7600 Internet routers (including the Cisco 7603, Cisco 7606, and Cisco 7609)

Determining Platform Support Through Cisco Feature Navigator

Cisco IOS software is packaged in feature sets that are supported on specific platforms. To get updated information regarding platform support for this feature, access Cisco Feature Navigator. Cisco Feature Navigator dynamically updates the list of supported platforms as new platform support is added for the feature.

Cisco Feature Navigator is a web-based tool that enables you to determine which Cisco IOS software images support a specific set of features and which features are supported in a specific Cisco IOS image. You can search by feature or release. Under the release section, you can compare releases side by side to display both the features unique to each software release and the features in common.

To access Cisco Feature Navigator, you must have an account on Cisco.com. If you have forgotten or lost your account information, send a blank e-mail to cco-locksmith@cisco.com. An automatic check will verify that your e-mail address is registered with Cisco.com. If the check is successful, account details with a new random password will be e-mailed to you. Qualified users can establish an account on Cisco.com by following the directions found at this URL:

http://www.cisco.com/register

Cisco Feature Navigator is updated regularly when major Cisco IOS software releases and technology releases occur. For the most current information, go to the Cisco Feature Navigator home page at the following URL:

http://www.cisco.com/go/fn

Availability of Cisco IOS Software Images

Platform support for particular Cisco IOS software releases is dependent on the availability of the software images for those platforms. Software images for some platforms may be deferred, delayed, or changed without prior notice. For updated information about platform support and availability of software images for each Cisco IOS software release, refer to the online release notes or, if supported, Cisco Feature Navigator.

Supported Standards, MIBs, and RFCs

Standards

- No new or modified standards

MIBs

- No new or modified MIBs

RFCs

- No new or modified RFCs

Prerequisites

The DFP agent subsystem has no prerequisites.

Configuration Tasks

To define the port number to be used by the DFP manager to connect to the IOS SLB DFP agent to receive DFP reports, enter the following commands in order, beginning in global configuration mode:

	Command	Description
Step 1	`Router(config)# ip dfp agent subsystem-name`	Identifies a DFP agent subsystem and initiates DFP agent configuration mode. See the **ip dfp agent** command for more details.
Step 2	`Router(config-dfp)# interval seconds`	(Optional) Configures a DFP agent weight recalculation interval. See the **interval (DFP agent)** command for more details.
Step 3	`Router(config-dfp)# password [0|7] password [timeout]`	(Optional) Configures a DFP agent password for MD5 authentication. See the **password** command for more details.
Step 4	`Router(config-dfp)# port port-number`	Defines the port number to be used by the DFP manager to connect to the DFP agent. See the **port (DFP agent)** command for more details.
Step 5	`Router(config-dfp)# inservice`	Enables the DFP agent for communication with a DFP manager. A DFP agent is inactive until both of the following conditions are met: • The DFP agent has been enabled using the **inservice (DFP agent)** command. • The client subsystem has changed the DFP agent's state to **ACTIVE**. See the **inservice (DFP agent)** command for more details.

Monitoring and Maintaining the DFP Agent Subsystem Feature

To obtain and display runtime information about the DFP agent subsystem, use the following commands in EXEC mode:

Command	Purpose
`Router# show ip dfp [agent subsystem_name] [detail]`	Displays information about DFP agents. See the **show ip dfp** command for more details.
`Router# show ip slb dfp [agent agent_ip_address port-number | manager manager_ip_address | detail | weights]`	Displays information about DFP and DFP agents, and about the weights assigned to real servers. See the **show ip slb dfp** command in the *Cisco IOS IP Command Reference, Volume 1 of 3: Addressing and Services, Release 12.2* for more details.

Configuration Examples

The following example shows the commands used to configure the DFP agent subsystem. Use these commands to accomplish the following tasks:

- Identify DFP agent subsystem *slb* and change the CLI to DFP agent configuration mode.
- Set the DFP agent weight recalculation interval to *11* seconds.
- Set the unencrypted DFP agent password to *Cookies* (to match the DFP manager's password) and the timeout to *180* seconds.
- Set the DFP communication port number for to *2221*.
- Enable the DFP agent for communication with the DFP manager.

```
Router(config)# ip dfp agent slb
Router(config-dfp)# interval 11
Router(config-dfp)# password Cookies 180
Router(config-dfp)# port 2221
Router(config-dfp)# inservice
```

Command Reference

This section documents only new and modified commands.

- **debug ip dfp agent, page 6**
- **inservice (DFP agent), page 7**
- **interval (DFP agent), page 8**
- **ip dfp agent, page 9**
- **manager (DFP agent), page 10**
- **password (DFP agent), page 11**
- **port (DFP agent), page 13**
- **show ip dfp, page 14**

debug ip dfp agent

To display debugging messages for the Dynamic Feedback Protocol (DFP) agent subsystem, use the **debug ip dfp** command in user EXEC or privileged EXEC mode. To stop debugging output, use the **no** form of this command.

debug ip dfp agent

no debug ip dfp agent

Syntax Description

This command has no arguments or keywords.

Defaults

No default behavior or values.

Command Modes

User EXEC or privileged EXEC mode

Command History

Release	Modification
12.1(8a)E	This command was introduced.
12.2(14)S	This command was integrated into Cisco IOS Release 12.2(14)S.
12.3(4)T	This command was integrated into Cisco IOS Release 12.3(4)T.
12.2(18)SXD	This command was integrated into Cisco IOS Release 12.2(18)SXD.

Usage Guidelines

This command displays debugging messages for the DFP agent subsystem.

See the following caution before using **debug** commands:

Caution Because debugging output is assigned a high priority in the CPU process, it can render the system unusable. For this reason, use **debug** commands only to troubleshoot specific problems or during troubleshooting sessions with Cisco technical support staff. Moreover, it is best to use **debug** commands during periods of lower network flows and fewer users. Debugging during these periods reduces the effect these commands have on other users on the system.

Examples

The following example configures a DFP agent debugging session:

```
Router# debug ip dfp agent
DFP debugging is on
```

The following example stops all debugging:

```
Router# no debug all
All possible debugging has been turned off
```

inservice (DFP agent)

To enable the Dynamic Feedback Protocol (DFP) agent for communication with a DFP manager, use the **inservice** command in DFP agent configuration mode. To remove the DFP agent from service, use the **no** form of this command.

inservice

no inservice

Syntax Description

This command has no arguments or keywords.

Defaults

The DFP agent is inactive.

Command Modes

DFP agent configuration

Command History

Release	Modification
12.1(8a)E	This command was introduced.
12.2(14)S	This command was integrated into Cisco IOS Release 12.2(14)S.
12.3(4)T	This command was integrated into Cisco IOS Release 12.3(4)T.
12.2(18)SXD	This command was integrated into Cisco IOS Release 12.2(18)SXD.

Usage Guidelines

A DFP agent is inactive until both of the following conditions are met:

- The DFP agent has been enabled using the **inservice (DFP agent)** command.
- The client subsystem has changed the DFP agent's state to **ACTIVE**.

When you use the **no** form of this command to remove a DFP agent from service, the DFP agent closes all open connections, and no new connections are assigned.

Examples

In the following example, the DFP agent is enabled for communication with a DFP manager:

```
Router(config)# ip dfp agent slb
Router(config-dfp)# inservice
```

Related Commands

Command	Description
agent	Identifies a DFP agent to which IOS SLB can connect.
ip dfp agent	Identifies a DFP agent subsystem and initiates DFP agent configuration mode.
ip slb dfp	Configures DFP, supplies an optional password, and initiates DFP configuration mode.

interval (DFP agent)

To configure a Dynamic Feedback Protocol (DFP) agent weight recalculation interval, use the **interval** command in DFP agent configuration mode. To restore the default setting, use the **no** form of this command.

interval *seconds*

no interval *seconds*

Syntax Description

seconds	Number of seconds to wait before recalculating weights for the DFP manager. The valid range is from 5 to 65535 seconds. The default is 10 seconds.

Defaults

The default **interval** value is 10 seconds.

Command Modes

DFP agent configuration

Command History

Release	Modification
12.1(8a)E	This command was introduced.
12.2(14)S	This command was integrated into Cisco IOS Release 12.2(14)S.
12.3(4)T	This command was integrated into Cisco IOS Release 12.3(4)T.
12.2(18)SXD	This command was integrated into Cisco IOS Release 12.2(18)SXD.

Usage Guidelines

The DFP agent sends a new weight to the DFP manager only if the new weight is different from the old weight. If the new weight is the same as the old weight, it is not sent to the DFP manager.

Examples

The following example shows how to configure the DFP agent to recalculate weights every 11 seconds:

```
Router(config)# ip dfp agent slb
Router(config-dfp)# interval 11
```

Related Commands

Command	Description
agent	Identifies a DFP agent to which IOS SLB can connect.
ip dfp agent	Identifies a DFP agent subsystem and initiates DFP agent configuration mode.
ip slb dfp	Configures DFP, supplies an optional password, and initiates DFP configuration mode.

ip dfp agent

To identify a Dynamic Feedback Protocol (DFP) agent subsystem and initiate DFP agent configuration mode, use the **ip dfp agent** command in global configuration mode. To remove the DFP agent identification, use the **no** form of this command.

ip dfp agent *subsystem-name*

no ip dfp agent *subsystem-name*

Syntax Description

subsystem-name	Character string used to identify the DFP agent subsystem: • **slb** for IOS SLB • **mobileip** for Mobile IP and the Home Agent Director The subsystem name enables the subsystem to send weights to a DFP manager. The subsystem name is limited to 15 characters.

Defaults

No DFP agent subsystem is defined.

Command Modes

Global configuration

Command History

Release	Modification
12.1(8a)E	This command was introduced.
12.2(14)S	This command was integrated into Cisco IOS Release 12.2(14)S.
12.3(4)T	This command was integrated into Cisco IOS Release 12.3(4)T.
12.2(18)SXD	The **mobileip** subsystem name was added.

Usage Guidelines

To discover the subsystem names that are available in your network, enter the **ip dfp agent ?** command.

Examples

The following example identifies a DFP agent subsystem named **slb**:

```
Router(config)# ip dfp agent slb
Router(config-dfp)#?
```

Related Commands

Command	Description
agent	Identifies a DFP agent to which IOS SLB can connect.
ip slb dfp	Configures DFP, supplies an optional password, and initiates DFP configuration mode.

manager (DFP agent)

This command has been removed. Its function is now performed by the **ip dfp agent** global configuration command, and by the following DFP agent configuration commands:

- **inservice (DFP agent)**
- **interval (DFP agent)**
- **password (DFP agent)**
- **port (DFP agent)**

See the description of these commands for more information.

password (DFP agent)

To configure a DFP agent password for MD5 authentication, use the **password** command in DFP agent configuration mode. To remove the DFP agent password, use the **no** form of this command.

password [**0** | **7**] *password* [*timeout*]

no password

Syntax Description

0	(Optional) Unencrypted password. This is the default setting.
7	(Optional) Encrypted password.
password	(Optional) Password value for MD5 authentication. **Note** This password must match the password configured on the host agent.
timeout	(Optional) Delay period, in seconds, during which both the old password and the new password are accepted. The valid range is from 0 to 65535. The default is 180.

Defaults

The password encryption default is 0 (unencrypted).

The password timeout default is 180 seconds.

Command Modes

DFP agent configuration

Command History

Release	Modification
12.1(8a)E	This command was introduced.
12.2(14)S	This command was integrated into Cisco IOS Release 12.2(14)S.
12.3(4)T	This command was integrated into Cisco IOS Release 12.3(4)T.
12.2(18)SXD	This command was integrated into Cisco IOS Release 12.2(18)SXD.

Usage Guidelines

The password specified on this command must match the password specified on the DFP manager.

The timeout option allows you to change the password without stopping messages between the DFP agent and its manager. The default value is 180 seconds.

During the timeout, the agent sends packets with the old password (or null, if there is no old password), and receives packets with either the old or new password. After the timeout expires, the agent sends and receives packets only with the new password; received packets that use the old password are discarded.

If you are changing the password for an entire load-balanced environment, set a longer timeout. This allows enough time for you to update the password on all agents and servers before the timeout expires. It also prevents mismatches between agents and servers that have begun running the new password and agents, and servers on which you have not yet changed the old password.

If you are running IOS SLB as a DFP manager, and you specify a password on the **ip slb dfp** command in global configuration mode, the password must match the one specified on the **password** command in DFP agent configuration mode in the DFP agent.

Examples

The following example sets the DFP agent password (unencrypted by default) to *Cookies* and the timeout to *360* seconds:

```
Router(config)# ip dfp agent slb
Router(config-dfp)# password Cookies 360
```

Related Commands

Command	Description
agent	Identifies a DFP agent to which IOS SLB can connect.
ip dfp agent	Identifies a DFP agent subsystem and initiates DFP agent configuration mode.
ip slb dfp	Configures DFP, supplies an optional password, and initiates DFP configuration mode.
replicate casa (firewall farm)	Configures a stateful backup of IOS SLB decision tables to a backup switch.
replicate casa (virtual server)	Configures a stateful backup of IOS SLB decision tables to a backup switch.

port (DFP agent)

To define the port number to be used by the Dynamic Feedback Protocol (DFP) manager to connect to the DFP agent, use the **port** command in DFP agent configuration mode. To disable the port number definition and remove existing connections, use the **no** form of this command.

port *port-number*

no port *port-number*

Syntax Description

port-number	Port number used by a DFP manager to connect to a DFP agent. The valid range is from 1 to 65535.

Defaults

No port number is defined.

Command Modes

DFP agent configuration

Command History

Release	Modification
12.1(8a)E	This command was introduced.
12.2(14)S	This command was integrated into Cisco IOS Release 12.2(14)S.
12.3(4)T	This command was integrated into Cisco IOS Release 12.3(4)T.
12.2(18)SXD	This command was integrated into Cisco IOS Release 12.2(18)SXD.

Examples

In the following example, the DFP manager is enabled to connect to the DFP agent using port number *2221*:

```
Router(config)# ip dfp agent slb
Router(config-dfp)# port 2221
```

Related Commands

Command	Description
agent	Identifies a DFP agent to which IOS SLB can connect.
ip dfp agent	Identifies a DFP agent subsystem and initiates DFP agent configuration mode.
ip slb dfp	Configures DFP, supplies an optional password, and initiates DFP configuration mode.

show ip dfp

To display information about Dynamic Feedback Protocol (DFP) agents and their subsystems, use the **show ip dfp** command in privileged EXEC command.

show ip dfp [**agent** *subsystem-name*] [**detail**]

Syntax Description

agent *subsystem-name*	(Optional) Displays information about the specified DFP agent, such as **slb** for IOS SLB.
detail	(Optional) Displays detailed DFP agent information.

Defaults

If no options are specified, the command displays output for all DFP agents identified by **ip dfp agent** commands, regardless of whether those agents are currently in service (**Inservice: yes**) or active (**AppActive: yes**).

Command Modes

Privileged EXEC

Command History

Release	Modification
12.1(8a)E	This command was introduced.
12.2(14)S	This command was integrated into Cisco IOS Release 12.2(14)S.
12.3(4)T	This command was integrated into Cisco IOS Release 12.3(4)T.
12.2(18)SXD	This command was integrated into Cisco IOS Release 12.2(18)SXD.

Usage Guidelines

Detailed output for the **show ip dfp** command includes information about all DFP agents configured with **ip slb agent** commands, regardless of whether those agents are currently in service.

Examples

The following example shows detailed information for DFP agent **slb**:

```
Router# show ip dfp agent slb detail

Unexpected errors: 0

DFP Agent for service: SLB
      Port: 666 Interval: 10
      Current passwd: <none> Pending passwd: <none>
      Passwd timeout: 0
      Inservice: yes  AppActive: yes

      Manager IP Address   Timeout
      ------------------   -------
      172.18.45.27         0

Weight Table Report for Agent SLB

      Weights for Port: 80  Protocol: TCP
```

```
          IP Address        Bind ID  Weight
          ---------------   -------  -------
          1.1.1.1           0        65535

      Weights for Port: 0 (wildcard)  Protocol: 0 (wildcard)

          IP Address        Bind ID  Weight
          ---------------   -------  -------
          0.0.0.0           65534    0

Bind ID Table Report for Agent SLB

      Bind IDs for Port: 80  Protocol: TCP

          Bind ID   Client IP        Client Mask
          -------   ---------------  ---------------
          0         0.0.0.0          0.0.0.0
```

Table 1 show ip dfp Field Descriptions

Field	Description
Port	TCP port number of the agent.
Interval	Number of seconds to wait before recalculating weights.
Current passwd	Current DFP password for MD5 authentication.
Pending passwd	Pending new DFP password for MD5 authentication.
Passwd timeout	Delay period, in seconds, during which both the current password and the new password are accepted.
Inservice	Indicates whether the DFP agent is enabled for communication with a DFP manager.
AppActive	Indicates whether the DFP agent is active.
Manager IP Address	IP address of the manager to which weights are being sent.
Timeout	Time period, in seconds, during which the DFP manager must receive an update from the DFP agent. A value of 0 means there is no timeout.
Weights for Port	Port for which the following weights are reported. 0 indicates a wildcard value.
Protocol	Protocol used for the port. 0 indicates a wildcard value.
IP Address	IP address for which weight is reported.
Bind ID	Bind ID associated with the IP address.
Weight	Weight calculated for the IP address.
Bind IDs for Port	Port for which the following bind IDs are reported.
Protocol	Protocol used for the port.
Bind ID	Bind ID of this instance of the real server.
Client IP	IP address of client using the virtual server.
Client Mask	IP network mask of client using the virtual server.

Related Commands

Command	Description
agent	Identifies a DFP agent to which IOS SLB can connect.
ip dfp agent	Identifies a DFP agent subsystem and initiates DFP agent configuration mode.
ip slb dfp	Configures DFP, supplies an optional password, and initiates DFP configuration mode.

Glossary

client subsystem—Users, such as IOS SLB, of the DFP agent function.

DFP—Dynamic Feedback Protocol. Allows host agents to dynamically report the change in status of the host systems providing a virtual service. The status reported is a relative weight that specifies a host server's capacity to perform work.

DFP agent—Object in a load-balanced environment that dynamically reports changes in status of the host systems that provide a virtual service. The status reported is a relative weight that specifies a host server's capacity to perform work. See also *DFP manager.*

DFP manager—Object in a load-balanced environment that collects status reports from DFP agents. See also *DFP agent*.

Dynamic Feedback Protocol—See *DFP.*

FA—Foreign agent. Router on a mobile node's visited network which provides routing services to the mobile node while registered. The foreign agent detunnels and delivers datagrams to the mobile node that were tunneled by the mobile node's home agent. For datagrams sent by a mobile node, the foreign agent may serve as a default router for registered mobile nodes.

foreign agent—See *FA*.

HA—Home agent. Router on a mobile node's home network which tunnels packets to the mobile node while it is away from home. It keeps current location information for registered mobile nodes called a mobility binding.

home agent—See *HA*.

IOS SLB—IOS Server Load Balancing. Load-balancing function in which the network administrator defines a virtual server that represents a group of real servers in a cluster of network servers known as a server farm. When a client initiates a connection to the virtual server, IOS SLB chooses a real server for the connection based on a configured load-balancing algorithm.

mobile node—A host or router that changes its point of attachment from one network or subnet to another. A mobile node may change its location without changing its IP address; it may continue to communicate with other Internet nodes at any location using its home IP address, assuming link-layer connectivity to a point of attachment is available.

Server Load Balancing—See *IOS SLB*.

services manager—Functionality built into IOS SLB that makes load-balancing decisions based on application availability, server capacity, and load distribution algorithms such as weighted round robin or weighted least connections, or the DFP. The services manager determines a real server for the packet flow using load balancing and server/application feedback.

SLB—See *IOS SLB*.