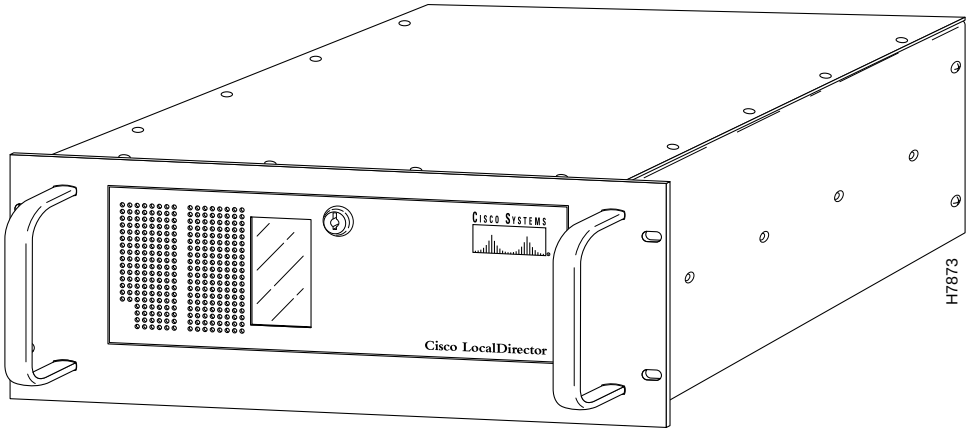
Introduction

Cisco LocalDirector balances network loads so that multiple servers appear as a single server. This guide describes how to install and configure LocalDirector. Figure 1 illustrates the appearance of the LocalDirector.

Figure 1 LocalDirector Front View



Many World Wide Web servers are straining to keep up with the volume of Internet traffic on the network. Millions of Internet browsers connect each day and all projections point to continued growth. As the Internet increases in commercial importance, sites are realizing that lost connections mean lost revenue. In addition to HTTP, LocalDirector balances any TCP service across distributed servers.

Before LocalDirector, sites could either buy faster machines or configure “round-robin” access between systems with DNS (Domain Name System). Sites found that buying faster machines became prohibitively expensive and configuring DNS did not provide failover for offline systems or caches containing incorrect pointers.

LocalDirector has these features:

- Reduces costs — LocalDirector provides an alternative to increasing system costs and DNS limitations. By configuring one-to-many mappings, you can assign virtual servers to your existing servers (known as “real” servers) and then direct traffic to real servers either selectively or redundantly so that you can balance the load regardless of server speed.

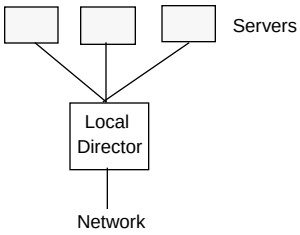
- Failover support (optional) — LocalDirector lets you connect a secondary LocalDirector to the primary and if the primary fails, the secondary takes over to keep your site available. When the primary is ready, it can be easily returned to service.
- Multiple server support — LocalDirector supports up to 1024 virtual servers. Multiple virtual servers can be bound to a single real server to provide additional redundancy. Complex sites can configure a number of virtual servers to a pool of real servers with different usage configurations to draw from. LocalDirector provides a single routing table that it shares with all virtual servers.
- Port mapping — LocalDirector provides a port mapper for binding real and virtual servers so that a single server can provide multiple Web home pages.
- Simplified administration — You can mark real servers as in or out of service. LocalDirector does not assign connections to servers that are out of service. When you mark a server as out of service while it is handling connections, LocalDirector lets the connections exit before removing the server from service. While out of service, the network administrator can change its configuration or power it off. When it is ready for service, you can mark it as in service and LocalDirector again assigns connections to it.
- Performance management — While LocalDirector runs, it measures the time a server takes to service a connection and constructs a load map of the servers so that it directs connections to the server with the least load.
- Support for 10BaseT and 100BaseTX networking.

Bridge Feature

In addition to its TCP-directing and load-balancing capabilities, LocalDirector also serves as a simple bridge to forward data packets between its interfaces. This ensures that LocalDirector does not interfere with network operation while it is in service and it can be brought online immediately after powering up without affecting network connectivity.

Because of its bridge capability, LocalDirector must not be installed on the network parallel to another bridge. Only use LocalDirector to connect to servers with a single way in or out to the network; for example, Figure 2 illustrates this concept:

Figure 2 Provide a Single Way In or Out



Getting Started

The LocalDirector shipping carton contains the following:

- Rack-mountable LocalDirector unit
- Keys for the front panel lock
- Power cord
- DB-9 to DB-25 null modem serial cable
- DB-25 gender adapter
- LocalDirector system diskette
- This guide
- Release notes
- *Regulatory Compliance and Safety Information for the LocalDirector*

Before Installing LocalDirector

Note Read the *Regulatory Compliance and Safety Information for the LocalDirector* before installing. Even though you probably read safety guidelines for the other products in your network, studying the material in this guide and the brief section that follows can help keep you safe and focused as you continue preparing your LocalDirector for service.

Follow these guidelines to ensure general safety:

- Keep the chassis area clear and dust-free during and after installation.
- Put the removed chassis cover in a safe place.
- Keep tools away from walk areas where you and others could fall over them.
- Do not wear loose clothing that could get caught in the chassis. Fasten your tie or scarf and roll up your sleeves.
- Wear safety glasses if you are working under any conditions that might be hazardous to your eyes.
- Do not perform any action that creates a potential hazard to people or makes the equipment unsafe.

Warning Before working on a system that has an on/off switch, turn OFF the power and unplug the power cord. Refer to the *Regulatory Compliance and Safety Information for the Cisco LocalDirector* for more information.

Warning Do not work on the system or connect or disconnect cables during periods of lightning activity.

Warning Do not touch the power supply when the power cord is connected. For systems with a power switch, line voltages are present within the power supply even when the power switch is off and the power cord is connected. For systems without a power switch, line voltages are present within the power supply when the power cord is connected. Refer to the *Regulatory Compliance and Safety Information for the Cisco LocalDirector* for more information.

Warning This product relies on the building's installation for short-circuit (overcurrent) protection. Ensure that a fuse or circuit breaker no larger than 120 VAC, 15A U.S. (240 VAC, 10A international) is used on the phase conductors (all current-carrying conductors).

Warning The device is designed to work with TN power systems.

Warning Ports labeled "Ethernet," "10BaseT," "Token Ring," "Console," and "AUX" are safety extra-low voltage (SELV) circuits. SELV circuits should only be connected to other SELV circuits. Because the BRI circuits are treated like telephone-network voltage, avoid connecting the SELV circuit to the telephone network voltage (TNV) circuits.

Warning Before working on equipment that is connected to power lines, remove jewelry (including rings, necklaces, and watches). Metal objects will heat up when connected to power and ground and can cause serious burns or can weld the metal object to the terminals. Refer to the *Regulatory Compliance and Safety Information for the Cisco LocalDirector* for more information.

Warning This equipment is intended to be grounded. Ensure that the host is connected to earth ground during normal use. Refer to the *Regulatory Compliance and Safety Information for the Cisco LocalDirector* for more information.

Warning Read the installation instructions before you connect the system to its power source. Refer to the *Regulatory Compliance and Safety Information for the Cisco LocalDirector* for more information.

Warning Ultimate disposal of this product should be handled according to all national laws and regulations. Refer to the *Regulatory Compliance and Safety Information for the Cisco LocalDirector* for more information.

Installing LocalDirector

To install and configure LocalDirector you need an ASCII terminal or a computer with serial communications software installed and running. The computer can be a Windows workstation, Macintosh system, or UNIX system.

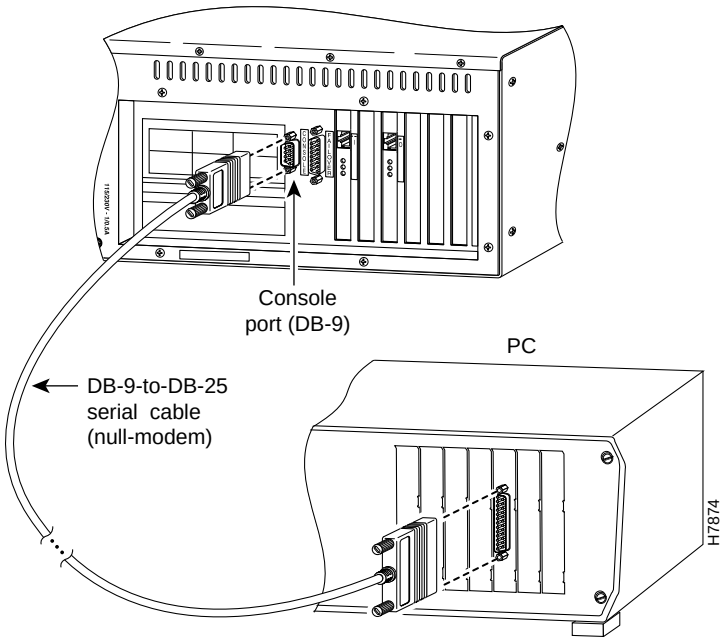
Install LocalDirector as follows:

Step 1 Unpack LocalDirector and place it in a convenient location.

Step 2 Connect the power cord to LocalDirector and plug it in.

Step 3 Connect the null modem serial cable to the LocalDirector DB-9 console port as shown in Figure 3:

Figure 3 Connect the Console to a PC

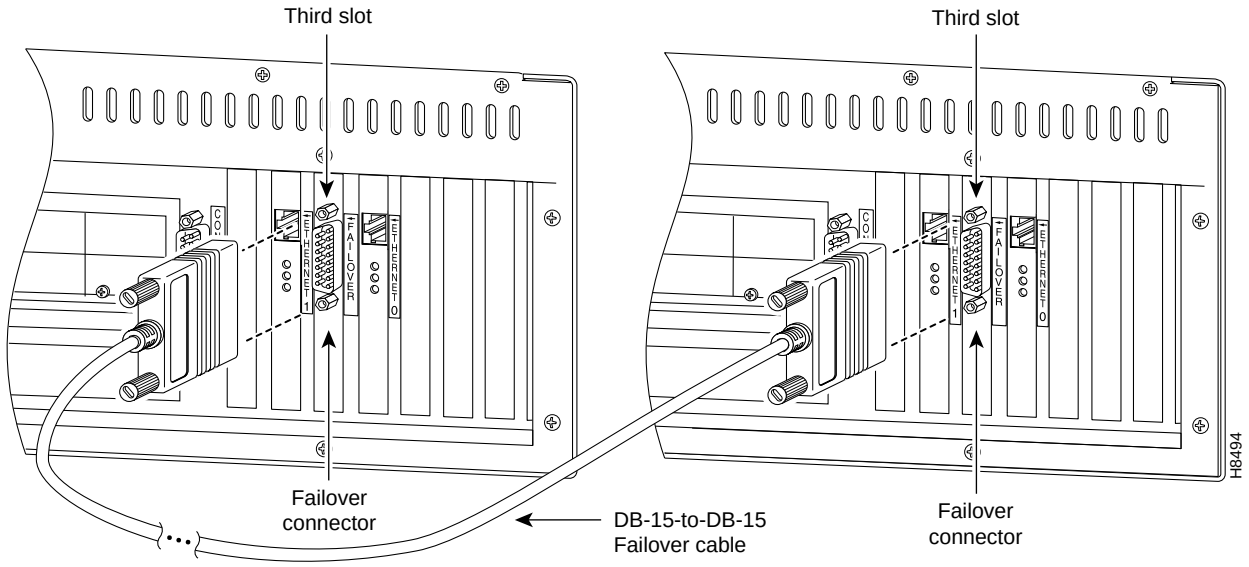


Step 4 Connect the LocalDirector serial console cable DB-25 connector to your ASCII terminal or computer. Use the gender adapter if necessary.

Step 5 Configure the serial port in your computer or terminal with these settings: 9600 baud, 8 data bits, no parity, and 1 stop bit; that is, set 9600, 8-N-1. Ensure your communications software is running.

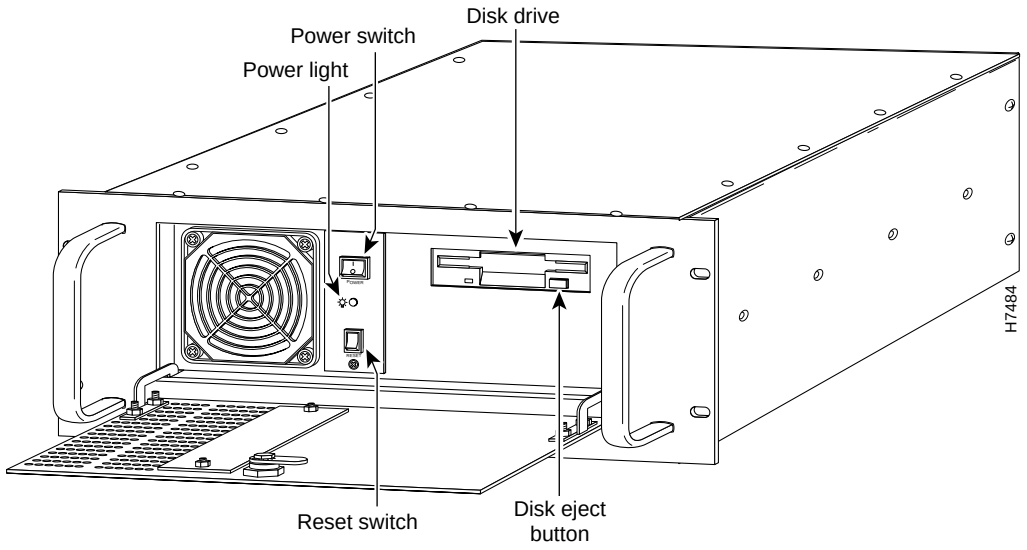
Step 6 If you purchased the optional failover cable, prepare the secondary LocalDirector as described in the previous steps and attach the failover cable between the two units. Attach the end of the cable labeled "0" to the unit that initially will be the primary unit, as shown in Figure 4. Attach the other end to the secondary unit. In the steps that follow, assume that the procedure for a single LocalDirector applies to both LocalDirector units.

Figure 4 Attach Optional Failover Cable Between Units



Step 7 Use the keys to open the LocalDirector front panel and turn on the power switch as shown in Figure 5. Because LocalDirector ships with its software already in flash RAM, LocalDirector boots without the need for you to insert the system diskette.

Figure 5 Open Front Panel and Power On Unit



Step 8 As LocalDirector boots, messages appear on your computer or terminal such as the following:

```
Copyright (c) 1996 by Cisco Systems, Inc.

             Restricted Rights Legend

Use, duplication, or disclosure by the Government is subject to restrictions as set
forth in subparagraph (c) of the Commercial Computer Softw1re - Restricted Rights
clause at FAR sec. 52.227-19 and subparagraph (c) (i) (ii) of the Rights in
Technical Data and Computer Software clause at DFARS sec. 252.227-7013.

             Cisco Systems, Inc.
             170 West Tasman Drive
             San Jose, California 95134-1706

Reloading Configuration From Memory

rotor>
```

Step 9 Connect the network cable from the hub containing the physical servers to LocalDirector.

Step 10 Connect the network cable from the remainder of your network to LocalDirector.

Step 11 Ping from a host on your network to a host on the hub. If this test succeeds, continue to the next step. If this test fails, test each side of the connection by pinging hosts on each network segment. If these fail, find the problem and fix it in your network and then test LocalDirector again. If these tests succeed, check all the connections and ensure that all connections are secure. After testing a single host on each LocalDirector interface, ping multiple hosts. Some Ethernet switches may only permit access to a single host served by LocalDirector and therefore cannot be used with LocalDirector.

You are now ready to configure LocalDirector. Until you configure LocalDirector, it acts as a bridge that does not affect your network.

Configuring LocalDirector

You can configure LocalDirector by entering commands on your console computer or terminal that are similar in context to those you use with Cisco routers.

Access Modes

The command interpreter provides a new command set that emulates IOS technologies. This command set provides three administrator access modes:

- Unprivileged mode displays the “>” prompt and lets you view current running settings.
- Privileged mode displays the “#” prompt and lets you change current settings and write to flash memory. Any unprivileged command also works in privileged mode.
- Configuration mode displays the “(config)#” prompt and lets you change system configurations. Only configuration mode commands work in this mode.

By default, the console is in unprivileged mode. You can access privileged mode by entering the **enable** command. LocalDirector then prompts you for a password. When you first configure LocalDirector, a password is not required. Press the Enter key at the prompt. When you are done configuring LocalDirector, assign a password to privileged mode with the **enable password** command. Exit privileged mode by entering the **disable** command.

You can access configuration mode by entering the **config** command. You can then write your settings to flash memory, diskette, or to your console computer. Exit configuration mode by entering ^Z or the **exit** command.

The commands in each access mode follow:

- Unprivileged mode: **enable**, **show bind**, **show bridge**, **show connections**, **show failover**, **show ip address**, **show ip route**, **show map**, **show processes**, **show real**, **show syslog**, and **show virtual**.
- Privileged mode: **clear arp-cache**, **clear bridge**, **configure floppy**, **configure memory**, **configure terminal**, **disable**, **reload**, **show config**, **show memory**, **write erase**, **write floppy**, **write memory**, and **write terminal**.
- Configuration mode: **arp**, **bind**, **enable password**, **exit**, **failover**, **hostname**, **in-service**, **interface ethernet**, **ip address**, **ip route**, **map**, **out-of-service**, **real**, **rip**, **sticky**, **syslog console**, **syslog host**, **syslog output**, **threshold**, and **virtual**.

Configuration Tasks

Configuring LocalDirector consists of two steps, configuring it for first use and then configuring it each time you add a server.

Configuring LocalDirector for First Use

Configure LocalDirector for first use as follows:

Step 1 Start configuration mode by entering **enable** in unprivileged mode and **configuration terminal** (you can abbreviate as **conf t**) in privileged mode.

Step 2 Assign the LocalDirector IP address and subnet mask with the **ip address** command.

Step 3 Set the speed of the Ethernet interface with the **interface ethernet** command.

Step 4 Change the privileged mode password with the **enable password** command.

Step 5 If preferred, change the host name for the LocalDirector prompt with the **hostname** command.

Step 6 Specify the failure threshold limit with the **threshold** command.

Step 7 If you have the optional failover cable feature, specify the **failover** command in both LocalDirectors' configuration files. (In a configuration file, only specify the **failover** command without arguments.)

Step 8 If RIP is not on your network, use the **no rip** command so that LocalDirector does not listen for RIP broadcasts.

Step 9 Designate the SYSLOG host with the **syslog host** command and specify the type of SYSLOG messages to accept with the **syslog output** command. Use **show syslog** to list the SYSLOG hosts and output level.

Step 10 Exit configuration mode by pressing **^z**.

Step 11 Store the configuration in flash memory with the **write memory** command.

Step 12 Exit privileged mode with the **disable** command.

Configuring Servers

Configure LocalDirector when you add a server as follows:

Step 1 Configure LocalDirector access to the real servers with the **real** command. Examine the information with the **show real** command.

Step 2 Configure virtual servers with the **virtual** command and, if required, assign the sticky duration with the **sticky** command. Use **show virtual** to examine virtual server information.

Step 3 Associate the real server to a virtual server with the **bind** command.

Step 4 If required, specify an entry to the ARP table with the **arp** command.

Step 5 If RIP is not available on the network, assign a route with the **ip route** command.

Step 6 Optionally assign port mappings with the **map** command.

Step 7 When ready, designate servers as in service with the **in-service** command.

Step 8 When done, exit configuration mode by pressing **^z**.

Step 9 Store the configuration in flash memory with the **write memory** command.

Step 10 Exit privileged mode with the **disable** command.

Table 1 lists configuration commands by LocalDirector features:

Table 1 Commands By Feature Summary

Item	Command	Access Mode
ARP cache:		
• Adjust	**arp**	Configuration
• Flush	**clear arp-cache**	Privileged
Failover cable (optional):		
• Configure	**failover**	Configuration
• Force LocalDirector to active	**failover active**	Configuration
• Force LocalDirector to standby	**failover standby**	Configuration
• Show status	**show failover**	Unprivileged
Fast Ethernet configuration	**interface ethernet**	Configuration
Flash memory access:		
• Clear	**write erase**	Privileged
• Display configuration	**show configuration**	Privileged
• Reload from	**reload**	Privileged
• Write to	**write memory**	Privileged
Floppy disk access:		
• Read from	**configure floppy**	Privileged
• Save configuration to	**write floppy**	Privileged
IP address, set	**ip address**	Configuration

Item	Command	Access Mode
Load balancing:		
• Bindings, associate or disassociate	**bind**	Configuration
• Bindings, show	**show bind**	Unprivileged
• Connection usage, show	**show conn**	Unprivileged
• In-service marking	**in-service**	Configuration
• Out-of-service marking	**out-service**	Configuration
• Port mappings, add or remove	**map**	Configuration
• Port mappings, show	**show map**	Unprivileged
• Real server entries, add or remove	**real**	Configuration
• Real server entries, show	**show real**	Unprivileged
• Sticky timers	**sticky**	Configuration
• Threshold counts, adjust	**threshold**	Configuration
• Virtual server entries, add or remove	**virtual**	Configuration
• Virtual server entries, show	**show virtual**	Unprivileged
MAC addresses:		
• Display associated with ports	**show bridge**	Unprivileged
• Flush associated with a bridge	**clear bridge**	Privileged
Processes, show thread information	**show processes**	Unprivileged
Prompt hostname, change	**hostname**	Configuration
RIP listening, enable or disable	**rip**	Configuration
Routing table:		
• Adjust	**ip route**	Configuration
• Show	**show ip route**	Unprivileged
Syslog:		
• Address, view	**show ip address**	Unprivileged
• Dump buffer to console	**syslog console**	Configuration
• Hosts, view current	**show syslog**	Unprivileged
• Messages, change facility and level	**syslog output**	Configuration
• Server, assign	**syslog host**	Configuration

Sample Configuration

A configuration example follows:

```
rotor> enable
Password:
rotor# config terminal
rotor(config)# ip address 192.168.13.40 255.255.255.0
rotor(config)# interface ethernet 0 10baseT
rotor(config)# interface ethernet 1 10baseT
rotor(config)# ^z
rotor# write memory
rotor# disable
rotor>
```

In this example, **enable** starts privileged mode. Then **config terminal** starts configuration mode. The **ip address** command specifies that the IP address for LocalDirector is 192.168.13.40 and that the subnet mask is 255.255.255.0. The **interface ethernet** command enables the Ethernet cards for 10baseT connections. Finally, the **^z** command exits configuration mode, **write memory** saves the new settings, and **disable** exits privileged mode.

Configuration Guidelines

Observe the following guidelines during configuration:

- Configure all virtual servers on the same network.
- Ensure any IP address you specify exists. Virtual server IP addresses must be unique on network. Real server IP addresses must be the NIC-registered IP addresses (if your network connects to the Internet).
- When you enter commands, you can erase characters with the Backspace and Del keys. You can erase the previous word with ^W, erase the previous line with ^U, and redisplay the line with ^R.

Command Reference

Configure LocalDirector using the commands that follow. You can enter commands from your console computer or terminal.

This section lists the commands in the following format:

`command` `(syntax` *variable variable[-variable]* `[keyword])` mode

variable	Required variable information
[variable]	Optional variable information

variable[-variable]	You can supply additional parameters separated by spaces or you can supply a range of values by using a dash as the separator. For example, you can specify three IP addresses with the **out-of-service** command as:
	`10.0.0.1 10.0.0.2 10.0.0.3`
	or as:
	`10.0.0.1-10.0.0.3`

`[keyword]`	Optional keyword

Command description.

```
example
```

Help Information

Help information is available by entering a question mark by itself for a listing of all commands, or with a command for command syntax. For example:

```
rotor> show map ?
show map [ip]
```

Commands

:(`: comment`) All modes. Comment character. Must be the first command in a line. Use to improve configuration file readability or to make configuration file commands not executable.

---

arp (`[no] arp` *`ip en`* `[alias]`) Configuration mode.

`ip`	IP address for the ARP table entry
`en`	Ethernet MAC address for the ARP table entry
`[alias]`	Causes LocalDirector to respond to ARP requests for this IP address

Adds an entry to the LocalDirector ARP table. Use **no arp** to delete an entry from the LocalDirector ARP table.

```
rotor(config)# arp 192.168.0.42 0000.0101.0202
rotor(config)# arp 192.168.0.43 0000.0101.0203 alias
rotor(config)# no arp 192.168.0.52
```

---

bind (`[no] bind` *`v_ip r_ip[-r_ip]`*) Configuration mode.

`v_ip`	IP address for the virtual server
`r_ip[-r_ip]`	One or more real server IP addresses

Associates a virtual server with one or more real servers. Use **virtual** or **real** to define the virtual and real server addresses before using **bind**. Use **no bind** to release an association between a real and virtual server.

```
rotor(config)# virtual 192.168.0.42
rotor(config)# real 192.168.0.3
rotor(config)# real 192.168.0.4
rotor(config)# bind 192.168.0.42 192.168.0.3
rotor(config)# no bind 192.168.0.42 192.168.0.4
```

---

clear arp-cache (`clear arp-cache`) Privileged mode. Clears the LocalDirector ARP table.

```
rotor# clear arp-cache
```

---

clear bridge (`clear bridge`) Privileged mode. Clears the LocalDirector bridge table.

```
rotor# clear bridge
```

---

configure floppy (`configure floppy`) Privileged mode. Replaces the current running configuration with the configuration stored on floppy disk. This command assumes that the floppy disk is in IBM format and was previously created by the **write floppy** command.

```
rotor# configure floppy
```

---

configure memory (`configure memory`) Privileged mode. Replaces the current running configuration with the configuration stored in flash memory.

```
rotor# configure memory
```

---

configure terminal (`configure terminal`) Privileged mode. Starts configuration mode. Exit configuration mode by entering **exit** or pressing ^Z. After exiting configuration mode, use **write memory** to store your changes in flash memory.

```
rotor# configure terminal
```

---

disable (`disable`) Privileged mode. Exits privileged mode and returns to unprivileged mode.

```
rotor# disable
rotor>
```

---

enable (`enable`) Unprivileged mode. Starts privileged mode. LocalDirector prompts you for your privileged mode password. Use **disable** to exit privileged mode. Use **enable password** to change the password.

```
rotor> enable
Password: ######
rotor# disable
rotor>
```

---

enable password (`enable password` *`newpassword`*) Configuration mode.

`newpassword` New password

Changes the privileged mode password, which appears after you enter the **enable** command.

---

failover (`[no] failover [active]`) Configuration mode.

`active` Forces LocalDirector failover into the active mode.

The **failover** command without an argument, indicates that you have connected the optional failover cable from your primary LocalDirector to a secondary LocalDirector. Failover works by passing control to the secondary unit should the primary unit fail. The switch between units occurs within 60 seconds of the failure event.

The primary LocalDirector does not maintain a copy of the connection state in the secondary unit. If the primary fails, the respective clients and servers must re-establish their own connections.

Put the **failover** command in the configuration files for both the primary and secondary units to enable failover.

If you want to force a LocalDirector to be active or go to standby you can use the **failover active** or **no failover active** command. Use this feature to force a LocalDirector offline for maintenance.

For configuration files, only use the **failover** command without the **active** argument.

Use the **show failover** command to verify the status of the connection.

```
rotor(config)# failover
```

---

hostname (`hostname` *`newname`*) Configuration mode.

`newname` New host name for the LocalDirector prompt

Changes the host name label on prompts. The default host name is “rotor.”

```
rotor(config)# hostname spinner
spinner(config)# hostname rotor
rotor(config)#
```

---

in-service (`in-service [virtual|real] ip[-ip]`) Configuration mode.

`virtual` Mark one or more virtual servers as in service.

`real` Mark one or more real servers as in service.

`ip[-ip]` One or more server IP addresses; if you specify more than one IP address, only IP addresses previously configured in LocalDirector are marked as in service.

Marks one or more real or virtual servers as being in service (IS). When servers are in service, they can handle client requests received by LocalDirector.

```
rotor(config)# in-service real 192.168.0.2
rotor(config)# virtual 192.168.0.80
rotor(config)# virtual 192.168.0.81
rotor(config)# virtual 192.168.0.85
rotor(config)# in-service virtual 192.168.0.80-192.168.0.85
rotor(config)# virtual 192.168.0.84
rotor(config)# show virtual
virtual machines:
           IP       State    Sticky
192.168.0.84        OOS         0
192.168.0.85         IS         0
192.168.0.81         IS         0
192.168.0.80         IS         0
```

---

interface ethernet (`interface ethernet unit [10baseT|100baseTX|auto]`) Configuration mode.

`unit` Interface number starting from 0.

`10baseT` 10Mbit Ethernet

`100baseTX` 100Mbit Ethernet

`auto` Automatically determine speed

Identifies the port bandwidth about a given Ethernet interface.

```
rotor(config)# interface ethernet 0 100baseTX
rotor(config)# interface ethernet 1 10baseT
```

---

ip address (`ip address` *`ip [mask]`*) Configuration mode.

`ip` IP address

`[mask]` Subnet mask

Assigns an IP address to the LocalDirector.

```
rotor(config)# ip address 130.10.2.1 255.255.255.0
```

---

ip route (`[no] ip route` *`network mask next-hop [metric]`*) Configuration mode.

`network` Destination IP network address; if default route, specify as all zeros (0.0.0.0)

`mask` Subnet mask for the network; if default route, specify as all zeros (0.0.0.0)

`next-hop` The adjacent gateway to reach *network*

`[metric]` Optional distance metric (defaults to one)

Adds a static route to the IP routing table. Use **no ip route** to remove a static route from the IP routing table.

```
rotor(config)# ip route 0.0.0.0 0.0.0.0 192.168.0.1.1
rotor(config)# no ip route 192.168.88.0
```

---

map (`[no] map` *`v_ip, vport, r_ip, rport`*) Configuration mode.

`v_ip` Virtual server IP address

`vport` Virtual server target port number

`r_ip` Real server IP address bound to *v_ip* by previous use of the **bind** command

`rport` Real server port number to map *vport* into. Connections bound for the virtual server that you assign to this real server also have the destination port number changed to *rport*.

Maps a virtual server IP address and port to a real server IP address and port. If you have multiple virtual servers pointing to a single real server, you need background programs (daemons) on the server with a unique address and port number to listen to. For example, if you have a number of home pages that all need to be invoked from daemons and each daemon requires a unique IP address and port on which to listen, you use **map** to point the virtual server IP address and port number to the real IP address and port.

When a real server is unbound from the virtual server, LocalDirector deletes all port mappings. Use **no map** to remove mappings. A virtual server IP address and port can be mapped to one or more real server IP addresses and ports. Use **show map** to display the current mappings.

```
rotor(config)# map 192.168.42.30 80 10.0.0.1 8001
rotor(config)# no map 192.168.42.99 20 10.42.42.0 8100
```

---

out-of-service (`out-of-service [virtual|real]` *ip[-ip]*) Configuration mode.

`virtual` Mark one or more virtual servers as out of service.

`real` Mark one or more real servers as out of service.

ip[-ip] One or more server IP addresses

Marks one or more virtual or real servers as being out of service (OOS). When you mark a real server as being out of service, LocalDirector does not assign new connections to it, but lets old connections continue to run until their translations complete. Any connection attempt or traffic on exiting connections causes LocalDirector to return a reset (RST) packet to the client. An out-of-service real server can still be accessed by clients specifying its actual IP address. Use **show real** to watch the status of open connections; when all connections appear as OOS, you can power-off the server or reconfigure it as required.

```
rotor(config)# out-of-service real 192.168.0.42
rotor(config)# out-of-service virtual 192.168.0.80-192.168.0.85
```

---

real (`[no] real` *ip* `[is|oos]`) Configuration mode.

ip IP address of an underling server.

`is` Mark server as being in service.

`oos` Mark server as being out of service (the default)

Define a real server. *ip* is the actual IP address of an underling server. Use **no real** to remove a real server from LocalDirector. Underling servers can always be accessed using their actual IP address.

```
rotor(config)# real 192.168.0.42
rotor(config)# real 192.168.0.7 is
```

reload (`reload`) Privileged mode. Reboots and reloads the system from flash memory. LocalDirector prompts for confirmation before starting.

```
rotor# reload
Proceed with reload?  [confirm] y

Rebooting...
```

rip (`[no] rip`) Configuration mode. Enables IP routing table updates from received RIP broadcasts. Use **no rip** to disable LocalDirector IP routing table updates. The default is to enable IP routing table updates.

```
rotor(config)# rip
rotor(config)# no rip
```

show bind (`show bind`) Unprivileged mode. Displays how virtual servers are bound to real servers. The left column displays the virtual server's IP address and its service state in parentheses. The right column displays the real servers that underlie the virtual server and its service state.

```
rotor> show bind
Virtual             Real
10.1.1.101 (OOS)
                     192.168.200.3 (OOS)
                     192.168.200.1 (OOS)
10.1.1.100 (OOS)
                     192.168.200.3 (OOS)
                     192.168.200.2 (OOS)
                     192.168.200.1 (OOS)
```

show bridge (`show bridge`) Unprivileged mode. Displays the table that the LocalDirector bridge uses to determine how data packets are forwarded. The table consists of MAC addresses, actions to take when the MAC address is seen, the interface the MAC address is associated with, the time in seconds since the last time the MAC address was observed, the number of times a MAC address has been sent on an interface, and the number of times a packet from the MAC address has been forwarded.

```
rotor> show bridge
Address         Action  Interface    Age   RXcnt  TXcnt
0000.243d.53f1  forward Ethernet1     85    197       0
0000.243d.53ef  forward Ethernet1    114    202       2
0000.243d.53f2  forward Ethernet0    166    169       1
```

show config (`show config`) Privileged mode. Displays the configuration saved in flash memory.

```
rotor# show config
:  Saved
... config commands ...
:  End
```

show connections (`show connections`) Unprivileged mode. Displays a summary of the current and maximum number of operating system connection objects utilized. This information represents the current and maximum number of simultaneous TCP connections made to virtual servers.

```
rotor> show connections
conns = 1 max = 2
```

show failover (`show failover`) Unprivileged mode. Displays the current failover status.

```
rotor> show failover
Failover On
interface 0
this host: active 0 225
other host: standby 0 0
interface 1
this host: active 0 225
other host: standby 0 0
```

show ip address (`show ip address`) Unprivileged mode. Displays the IP address of the LocalDirector. You can ping this address to display the address of the syslog output.

```
rotor> show ip address
System IP 10.1.1.1, system subnet 255.255.255.0
```

show ip route (`show ip route`) Unprivileged mode. Displays the IP routing table. All virtual servers on the LocalDirector share this single IP routing table. The routing table display contains the destination network number and mask, along with the next hop IP address, the distance metric, and, if the route was manually entered, a static keyword.

```
rotor> show ip route
network=0.0.0.0 Address=192.168.0.1 Distance=1 static
```

show map (`show map` *v_ip*) Unprivileged mode.

v_ip Virtual server IP address

Displays the LocalDirector TCP port mappings for one or all of the virtual servers.

```
rotor> show map 192.168.0.42
Port mappings for 192.168.0.42
192.168.0.42    80 maps to 192.168.0.2   8002
rotor> show map
Port mappings for all machines
192.168.0.42    80 maps to 192.168.0.2   8002
192.168.0.77    80 maps to 192.168.0.2   8001
```

show memory (`show memory`) Privileged mode. Displays a summary of the maximum physical memory and current free memory available to the LocalDirector operating system. Everything in LocalDirector is preallocated and the amount of free memory should never change.

```
rotor> show memory
32505856 bytes total,  402860 bytes free
```

show processes (`show processes`) Unprivileged mode.Displays a summary listing of running processes. Processes are lightweight threads requiring only few instructions to switch. In the listing, PC is the program counter, SP is the stack pointer, STATE is the address of a thread queue, Runtime is the number of milliseconds that the thread has been running, SBASE is the stack base address, Stack is the current number of bytes used and the total size of the stack, and Process lists the thread's function.

```
rotor> show processes
      PC        SP    STATE   Runtime       SBASE    Stack Process
8000139e 8024ad00  80005354       940    80249d1c    36/4096 arp_timer
...
```

show real (`show real` *[ip]*) Unprivileged mode.

[ip] Real server IP address

Lists real server information. If you specify an IP address, LocalDirector displays a summary for all virtual servers using the real server. The listing contains the service state of each real server, its failure threshold value, and a reassigned count of the current number of failures (timeouts) that occurred while trying to reach the real server.

```
rotor> show real
real machines:
          IP Connect  Ratio  Load  State  Thresh  re-assigned
192.168.0.42       0   5120   2213    IS       8             0
rotor> show real 192.168.0.42
real 192.168.0.42 referenced by:
             IP   State   Sticky
   192.168.0.42      IS        0
   192.168.0.77      IS        0
```

show syslog (`show syslog`) Unprivileged mode. Displays information about the current SYSLOG hosts.

show virtual (`show virtual` *[ip]*) Unprivileged mode.

[ip] Virtual server IP address

Lists virtual server information. The listing includes the service state of each virtual server and its sticky value. You can specify the IP address for a server to view more information.

```
rotor> show virtual
virtual machines:
          IP Connect  Ratio  Load  State  Thresh  re-assigned
192.168.0.40       0   3840     0     IS       8            0
rotor> show virtual 192.168.0.40
virtual 192.168.0.40 consists of:
             IP   State   Sticky
   192.168.0.40      IS        0
   192.168.0.77      IS        0
```

sticky (`sticky` *ip minutes*) Configuration mode.

ip Virtual server IP address

minutes The time after which a connection from the same client can be reassigned to a different real server. The default is 0 minutes.

Sets the number of minutes during which a repeat request from a client should be passed to the same real server as the first request. Use this command if the real servers are caching information about their clients or their requests. Use **show virtual** to display the sticky value.

```
rotor(config)# sticky 192.168.0.42 5
```

syslog console (`[no] syslog console`) Configuration mode. Displays syslog messages on the console port. Use **no syslog console** to stop the display.

```
rotor(config)# syslog console
rotor(config)# no syslog console
```

syslog host (`[no] syslog host` *ip*) Configuration mode. Configures one or more host systems to receive syslog messages. Use **no syslog host** to remove a host from the receiving list. Use **show syslog** to view the current hosts.

```
rotor(config)# syslog host 192.168.0.99
rotor(config)# no syslog host 192.168.0.99
```

syslog output (`[no] syslog output` *facility.level*) Configuration mode.

facility Eight facilities LOCAL0(16) through LOCAL7(23); the default is LOCAL4(20). Hosts file the messages based on the *facility* number in the message.

level Message type; sets the level above which LocalDirector suppresses messages to the SYSLOG hosts. Setting the level to 3, for example, allows messages with levels 0, 1, 2, and 3 to display. Default is 3.

The levels are as follows:

0 System unusable

1 Take immediate action

2 Critical condition

3 Error message

4 Warning message

5 Normal but significant condition

6 Informational message

7 Debug-level messages

Configures the facility and level of SYSLOG messages. Because network devices share the eight facilities, **syslog output** lets you set the facility marked on all messages.

```
rotor(config)# syslog output 23.4
```

---

threshold (`threshold` *ip reassigns*) Configuration mode.

ip Real server IP address

reassigns The number of consecutive connection reassignments to tolerate; the default is 8. Zero is the same as one and the maximum number of reassigns is limited only by the size of an integer in memory.

Configures the number of consecutive TCP connection reassignments that a real server can exhibit before LocalDirector marks the real server as failed. Use **show real** to display real threshold values and to see which real servers have failed. Failed real servers are not utilized by virtual servers while in the failed state; however, LocalDirector retests each failed server periodically with a single TCP connection attempt to see if the server has returned to normal behavior. If so, LocalDirector marks the server in service which makes it available to handle virtual server requests.

```
rotor(config)# threshold 192.168.0.60 4
```

---

virtual ([no] virtual *ip* [is|oos]) Configuration mode.

ip IP address of a virtual server; the address must be unique to the network.

is Mark server as being in service.

oos Mark server as being out of service (the default)

Creates a virtual server to accept a connection from the network. LocalDirector assigns connections arriving at a virtual address to a real server. The network component of a virtual server's IP address must match the network component of the IP address assigned to LocalDirector using the **ip address** command. Specify **ip address** before specifying the **virtual** command. If no real servers are bound to the virtual server, use **no virtual** to remove the virtual server from LocalDirector.

```
rotor(config)# virtual 192.168.0.42
rotor(config)# no virtual 192.168.0.42
```

---

write erase (write erase) Privileged mode. Clears the flash memory configuration. To clear the current running configuration, use **write erase** and then **reload**.

```
rotor# write erase
rotor# reload
```

write floppy (`write floppy`) Privileged mode. Saves the current running configuration to floppy disk. Use **configure floppy** to merge the configuration into the currently running box. The **write floppy** command assumes that the floppy disk is formatted for an IBM computer.

```
rotor# write floppy
```

write memory (`write memory`) Privileged mode. Saves the current running configuration to flash memory. Use **configure memory** to merge the configuration into the currently running box.

```
rotor# write memory
```

write terminal (`write terminal`) Privileged mode. Saves the current running configuration to the console computer. Use **configure terminal** to merge the configuration into the currently running box and then to paste the configuration back into the terminal. You can also use **configure terminal** to display the current configuration.

```
rotor# write terminal
```