



Installation Requirements

This chapter describes the hardware and software components required to install Cisco Prime Optical in an HA environment. It contains the following sections:

- [Hardware Requirements, page 2-1](#)
- [Software and Support Requirements for a Local Redundancy Configuration, page 2-7](#)
- [Software and Support Requirements for a Geographical Redundancy Configuration, page 2-8](#)
- [Overview of Prime Optical Commands, page 2-9](#)
- [Overview of Sudo Commands, page 2-10](#)



Note

Although Cisco makes every attempt to ensure the availability of third-party hardware and software platforms specified for Prime Optical, Cisco reserves the right to change or modify system requirements due to third-party vendor product availability or changes that are beyond Cisco's control. Part numbers are subject to change.

Hardware Requirements

To install Prime Optical in an HA environment, you must configure a fault-tolerant storage array. This section describes an installation that uses a fault-tolerant storage array for small, medium, large, and high-end configurations.



Note

Prime Optical 10.6 is compatible with Linux RHEL 6.5, 6.6, 6.7, 7.1, and 7.2.

Server Configuration

The Prime Optical server runs on any of the platforms listed in [Table 2-1](#).

Table 2-1 Supported Platforms and Operating Systems

Platform	Operating System
Cisco UCS B series	Red Hat Enterprise Linux (RHEL) 6.5, 6.6, 6.7, 7.1, 7.2, server 64-bit
Cisco UCS C series	

**Note**

It is possible to use and configure disk arrays for database storage with any type of Redundant Array of Independent Disks (RAID) layout. You can do so only if the disk throughput is equal to or higher than the throughput calculated for internal disks. The minimum RAID configuration is 1+0.

Table 2-2 Minimum Processor Requirements

Network Size	Cisco UCS B or UCS C Series
Small	2 x Intel Xeon 5620
Medium	2 x Intel Xeon 5620
Large	2 x Intel Xeon 5620
High end	2 x Intel Xeon 5640

Cisco tests the simulated network configurations listed in [Table 2-3](#). Your setup and performance might vary depending on the size of your network and the usage pattern of management tasks.

Table 2-3 Minimum Memory Requirements for the Prime Optical Server Installation

Network Size	Oracle Database Type	RAM	No. of Network Partitions ¹	Maximum No. of NEs ²
Small	Enterprise Edition	8 GB	1	200
Medium	Enterprise Edition	16 GB	1	500
Large	Enterprise Edition	32 GB	4	2000
High end	Enterprise Edition	96 GB	8	5000

1. In Prime Optical 10.6, a single NE service (or a single network partition) can support up to 750 nodes.

A high-end network supports any combination of up to 5000 nodes, 8 network partitions, and 750 nodes per network partition. For example, 6 NE services with 750 nodes + 1 NE service with 500 nodes (6 x 750 + 1 x 500 = 5000).

A large network supports any combination of up to 2000 nodes, 4 network partitions, and 750 nodes per network partition. For example, 4 NE services with 500 nodes (4 x 500), 2 NE services with 750 nodes + 1 NE service with 500 nodes (2 x 750 + 1 x 500).

2. These numbers assume you are using fully equipped ONS 15454 MSPP nodes (for example, 12 OC-48, 2 TCC, and 1 XC10G with up to 2 links and 48 SONET cross-connections per node). Note that these numbers should be used as a guideline, and vary depending on the software and hardware configuration of your NEs.

The following list describes the server configuration parameters and the effect of changes in each parameter on the maximum number of NEs the server can manage:

- Network Size—If the network size increases, more resources are reserved for the higher number of NEs to be managed.
- RAM—The server can manage more NEs as the RAM increases. The server can manage fewer NEs as the RAM decreases.

- Number of Network Partitions—For each network partition, the server reserves resources for the higher number of NEs to be managed. The server can manage more NEs as the number of network partitions increases. The server can manage fewer NEs as the number of network partitions decreases.

Generic Disk Storage Array Configuration

Table 2-4 lists the disk partition requirements for a small-to-high-end generic storage array.

The optional database partitions /db01_rd and /db02_rd described in the *Cisco Prime Optical 10.6 Installation Guide* are not supported in HA geographical redundancy configurations.

Note the following disk array constraints:

- The disk array must support at least RAID 1+0.

Table 2-4 Configuration for a Small-to-High-End Single- or Dual-Node Generic Disk Storage Array—PM Collection Enabled in a Linux Environment

Network Size	Disk Space	root	swap	/oracle	/cisco ¹	/db01	/db02	/db03	/db04	/db05	/ctm_backup
Small	160 GB (min) 251 GB (max)	12 GB	12 GB	20 GB	20 GB	12 GB	6 GB	40 GB	30 GB	8 GB	101 GB
Medium	278 GB (min) 476 GB (max)	12 GB	24 GB	20 GB	20 GB	16 GB	16 GB	90 GB	70 GB	10 GB	208 GB
Large	488 GB (min) 872 GB (max)	12 GB	48 GB	20 GB	20 GB	20 GB	26 GB	190 GB	140 GB	12 GB	394 GB
High end	900 GB (min) 1648 GB (max)	12 GB	96 GB	20 GB	20 GB	24 GB	50 GB	360 GB	300 GB	18 GB	758 GB

1. 10 GB is required for cisco, but 20 GB is strongly recommended.

Table 2-5 show the disk array configuration when PM collection is enabled and disabled in a Linux environment with an embedded database installation.

Table 2-5 Configuration for a Small-to-High-End Single- or Dual-Node Generic Disk Storage Array—PM Collection Disabled in a Linux Environment

Network Size	Disk Space	root	swap	/oracle	/cisco ¹	/db01	/db02	/db03	/db04	/db05	/ctm_backup
Small	105 GB (min) 135 GB (max)	12 GB	12 GB	20 GB	20 GB	12 GB	6 GB	8 GB	7 GB	8 GB	40 GB
Medium	140 GB (min) 192 GB (max)	12 GB	24 GB	20 GB	20 GB	16 GB	16 GB	12 GB	10 GB	10 GB	62 GB
Large	196 GB (min) 276 GB (max)	12 GB	48 GB	20 GB	20 GB	20 GB	26 GB	20 GB	18 GB	12 GB	90 GB

Table 2-5 Configuration for a Small-to-High-End Single- or Dual-Node Generic Disk Storage Array—PM Collection Disabled in a Linux Environment (continued)

High end	292 GB (min) 418 GB (max)	12 GB	96 GB	10 GB	20 GB	24 GB	50 GB	28 GB	24 GB	18 GB	136 GB
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- 10 GB is required for cisco, but 20 GB is strongly recommended.

Figure 2-1 and Figure 2-2 shows the hardware configuration of a small-to-high-end generic storage array at single-node and dual-node cluster sites.

Figure 2-1 Hardware Configuration of a Small-to-High-End Generic Disk Array for a Single-Node Site

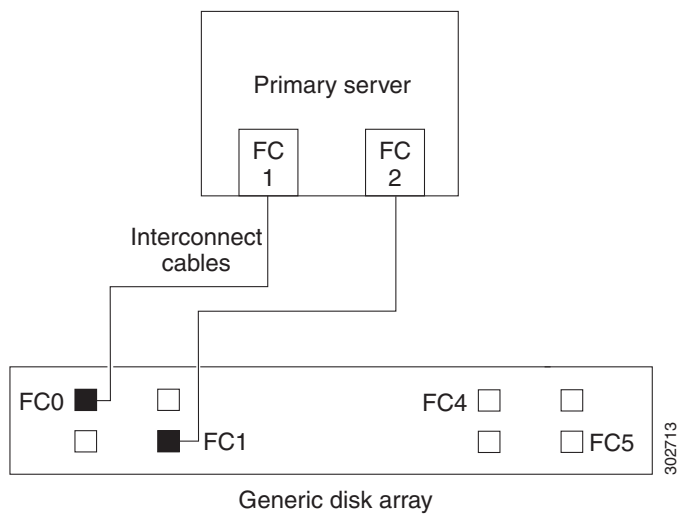
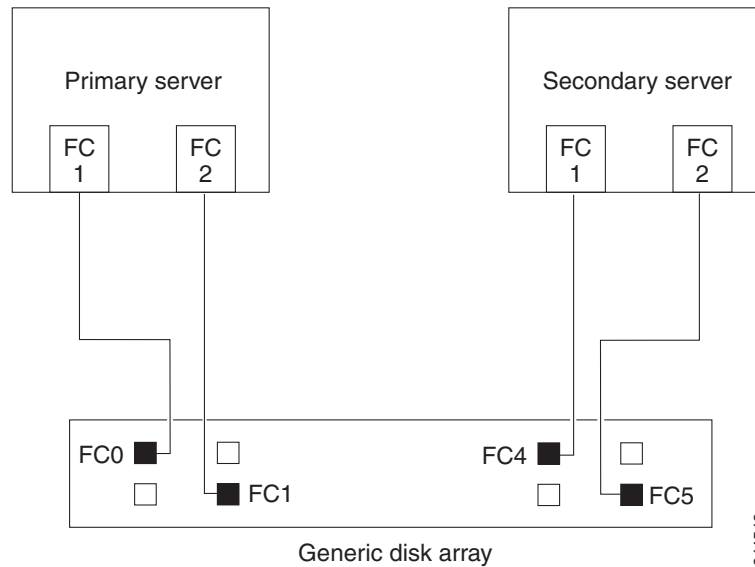


Figure 2-2 *Hardware Configuration of a Small- and Medium-to-High-End Generic Disk Array for a Dual-Node Site*



Additional Hardware for a Single-Node Site

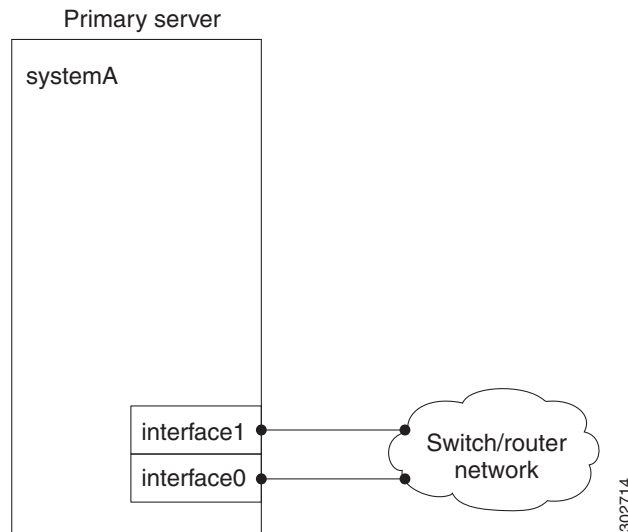
To ensure redundancy for the network connection, verify that each server has at least two network interface cards (NICs).

To ensure redundancy for the disk array connections, each server requires either one fiber channel, dual-port host bus adapter (HBA) or two fiber channel, single-port HBAs (preferred).

You must have two fiber cables per server to connect the server to the disk array.

Figure 2-3 shows the HA solution in a multiple NIC configuration for a single-node site.

Figure 2-3 Multiple NIC Configuration for a Single-Node Site



Note

A fault-tolerant switched/routed network is recommended for communication with the HA servers.

Additional Hardware for a Dual-Node Site

To ensure redundancy for the network connection, verify that each server has at least two NICs. The local heartbeat requires at least two additional NICs per server, for a total of at least four NICs per server.

To ensure redundancy for the disk array connections, each server requires either one fiber channel, dual-port HBA or two fiber channel, single-port HBAs (preferred).

You must have two fiber cables per server to connect the server to the disk array. The local heartbeat requires two cross-over Ethernet cables.

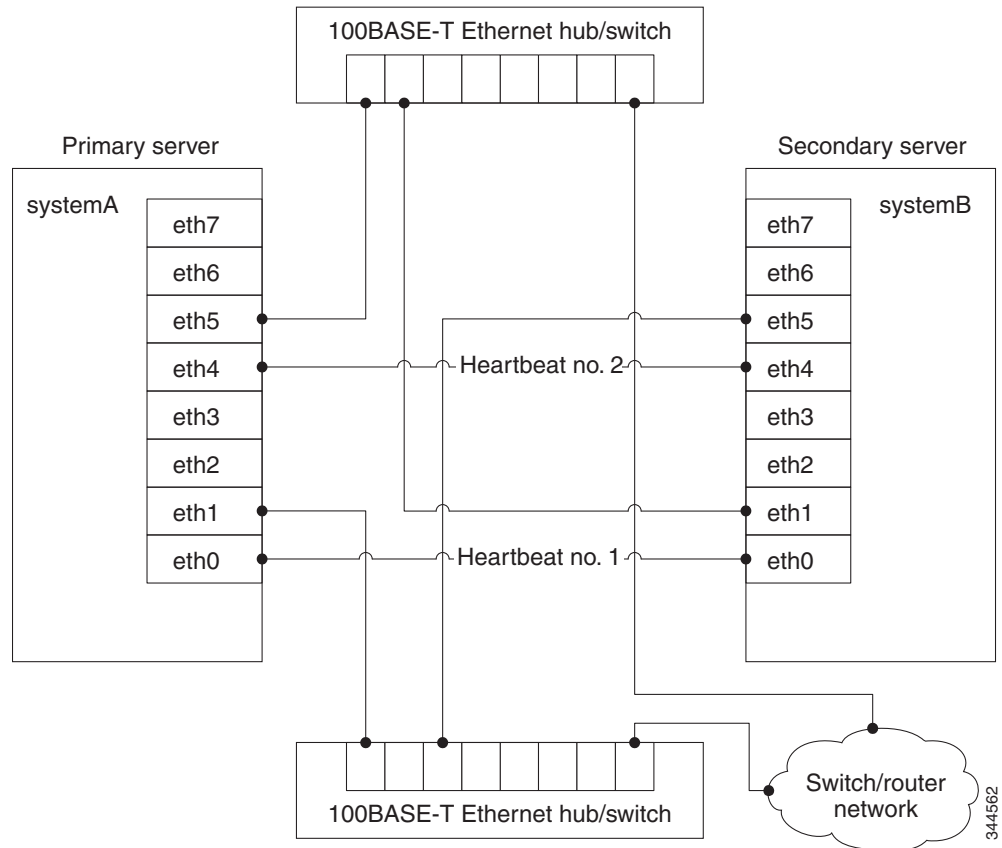


Note

A fault-tolerant, switched/routed network is recommended for communication with the HA servers.

Figure 2-4 illustrates the HA solution in an NIC configuration for a dual-node site for Linux.

Figure 2-4 NIC Configuration for a Dual-Node Site for Linux

**Note**

eth1 and eth5 are bonded in bond0. eth0 and eth4 are bonded in bond1.

Software and Support Requirements for a Local Redundancy Configuration

Table 2-6 lists the software that is required to install Prime Optical in a local redundancy HA configuration.

Table 2-6 Software Requirements for Prime Optical in a Local Redundancy HA Configuration for Linux

Software Configuration	Quantity
Cisco Prime Optical 10.6	1
Note If you install Prime Optical GateWay/CORBA, an optional CORBA-based interface that provides higher-layer management systems with information for all supported NEs, you must purchase a separate license.	
Linux Red Hat Enterprise 6.7, and 7.2, 64-bit	1
Red Hat Cluster Suite (RHCS) 6.5, 6.6, 6.7, 7.1, and 7.2	1

Table 2-6 Software Requirements for Prime Optical in a Local Redundancy HA Configuration for Linux (continued)

Software Configuration	Quantity
Cisco Prime Optical Ha Agent Release 1.5-3 (RHEL-6.x)	1
Cisco Prime Optical Ha Agent Release 1.0-1 (RHEL-7.x)	
Oracle 12c software (Oracle Not Embedded database setup), plus the following patches: <ul style="list-style-type: none"> January 2011 Patch Set Update (PSU) 10404530 	1

Software and Support Requirements for a Geographical Redundancy Configuration

[Table 2-7](#) lists the software and external support requirements for a local redundancy configuration.

The requirements for a geographical redundancy HA configuration for Linux are the same requirements as listed in the local redundancy HA configuration ([Table 2-6](#)).

Table 2-7 Software Requirements for Prime Optical in a Geographical Redundancy HA Configuration for Linux

Software Configuration	Quantity
Cisco Prime Optical 10.6	1
Note If you install Prime Optical GateWay/CORBA, an optional CORBA-based interface that provides higher-layer management systems with information for all supported NEs, you must purchase a separate license.	
Linux Red Hat Enterprise 6.5 and 6.6, 64-bit	1
RHCS 6.5, 6.6, 6.7, 7.1, and 7.2	1
Cisco Prime Optical Ha Agent Release 1.5-3 (RHEL-6.x) (Oracle Not Embedded database setup)	1
Cisco Prime Optical Ha Agent Release 1.0-1 (RHEL-7.x) (Oracle Not Embedded database setup)	
Oracle 12c software (Oracle Not Embedded database setup), plus the following patches: <ul style="list-style-type: none"> January 2011 Patch Set Update (PSU) 10404530 	1

VMware Support

Prime Optical can run on a virtual machine (VM) on VMware vSphere version 5.5 and 6.0. VM RAM, Disk and partitioning requirements must comply with the same requirements for a nonvirtualized setup based on system size. Do the following:

-
- Step 1** Assign RAM as listed in [Server Configuration, page 2-1](#).
 - Step 2** Follow disk space and partition requirements as listed in [Generic Disk Storage Array Configuration, page 2-3](#).

- Step 3** Configure VM vCPU settings. Refer to VMware VSphere performance guidelines for information on vCPU settings.
- As a general guideline, it is suggested to configure 2vCPU for every 500 nodes. This is based on a UCS C210 M2 machine, with a dual-socket, multicore 2.93 GHz processor in a medium network Prime Optical setup during Cisco internal validation.
- Step 4** Confirm that the /etc/hosts file exists inside the guest OS of the VM and that the hostname (with and without a domain) is associated to the proper IP address and not to the loopback IP 127.0.0.0.

Example of a correct entry in the /etc/hosts file:

```
127.0.0.1 localhost localhost.localdomain
::1 localhost localhost.localdomain
10.58.235.252 ha1-106 ha1-106.cisco.com ha1-106-hb.cisco.com
10.58.235.253 ha2-106 ha2-106.cisco.com ha2-106-hb.cisco.com
```

Example of an incorrect entry in the /etc/hosts file:

```
127.0.0.1 ha1-106 localhost.localdomain localhost
::1 localhost6.localdomain6 localhost6
```

where the hostname ha1-106 is associated to the loopback address 127.0.0.1.



Note The file can be wrong if the VM OS was installed without network connectivity.

Overview of Prime Optical Commands

[Table 2-8](#) describes the Prime Optical commands that can be used during installation and troubleshooting.

Table 2-8 Prime Optical Commands

Command	Description
opticalctl start	<p>A complete set of administrative command scripts is added to the application during installation. One command automatically starts the Prime Optical server processes every time the server is started. The server processes can also be started or stopped manually as necessary; the scripts are located in the /opt/CiscoTransportManagerServer/bin directory.</p> <p>The opticalctl start command sets the appropriate environment variables and starts the Prime Optical server. The amount of time it takes for the Prime Optical server to start varies based on the number of NEs in the configuration and the size of the database. Use opticalctl start only when the Prime Optical server has stopped.</p> <p>It can take from 0 to 5 minutes for the server processes to start after the opticalctl start command has finished execution. This is because NE services and gateway services (if enabled) are still initializing for all of the NEs that are deployed.</p> <p>Five minutes after entering the opticalctl start command, enter the opticalctl status command. By this time, the NE service corresponding to all the deployed NEs must have started.</p>
opticalctl stop	<p>The opticalctl stop command stops the Prime Optical server gracefully. The stop procedure shuts down the server and cleans all memory and connections. The overall process takes approximately 5 minutes.</p>
opticalctl abort	<p>The opticalctl abort command kills all of the running processes and stops the Prime Optical server. The overall process takes no longer than 2 to 3 minutes.</p>
opticalctl status	<p>The opticalctl status command provides Prime Optical version and process information. The following options are available:</p> <ul style="list-style-type: none"> • opticalctl status -h—Shows help information about all options available. • opticalctl status -c—Shows TCP/LISTEN and UDP open connections of application processes. • opticalctl status -a—Shows all connections of application processes. • opticalctl status -v—Shows all application processes. <p>For example:</p> <pre>opticalctl status -c -a</pre> <p>Note To enable the opticalctl status options for Solaris 10, you must install the lsof-4.80 package. You can download the Solaris 10 lsof-4.80 package at www.sunfreeware.com.</p>

Overview of Sudo Commands



Note

Only a Prime Optical root user (chosen during installation) can use Sudo commands.

Sudo software (freeware) version 1.6.9 is bundled with the Prime Optical software. The sudo software enables nonroot UNIX users to run UNIX commands throughout the installation process. The following commands are available:

- **opticalctl start**
- **opticalctl stop**
- **opticalctl abort**

- `opticalctl status`
- `prune_auditlog.sh`
- `prune_errlog.sh`
- `prune_audittrail.sh`
- `prune_fm.sh`
- `prune_pm.sh`
- `prune_ne.sh`
- `prune_server_monitor.sh`
- `prune_admin_job_table.sh`

**Note**

You can still use the following legacy commands in Prime Optical 10.6:

- `ctms-start`
- `ctms-abort`
- `ctms-stop`
- `ctms-stop-service`
- `showctm`

If you selected the **Install Sudo Software** option during the Prime Optical server installation, the setup program prompts you to specify the name of the UNIX group to which you want to assign administrator privileges. By default, this group is set to the root group. If you specify a group other than root, the setup program verifies that the UNIX group exists on the system and adds entries to the `/etc/sudoers` file. Entries in this file reflect the commands that the specified UNIX group can run by using the `sudo` command.

To issue each command, log in to the Prime Optical server workstation as the root user or `optusr` and enter the command on the command line.

The following entries in the `/etc/sudoers` file reflect the commands that can be run as nonroot:

```
%CTM_UNIX_group hostname=(root) NOPASSWD: /usr/bin/prune_admin_job_table.sh
%CTM_UNIX_group hostname=(root) NOPASSWD:
/opt/CiscoTransportManagerServer/bin/prune_admin_job_table.sh
%CTM_UNIX_group hostname=(root) NOPASSWD: /usr/bin/prune_server_monitor.sh
%CTM_UNIX_group hostname=(root) NOPASSWD:
/opt/CiscoTransportManagerServer/bin/prune_server_monitor.sh
%CTM_UNIX_group hostname=(root) NOPASSWD: /usr/bin/prune_ne.sh
%CTM_UNIX_group hostname=(root) NOPASSWD: /opt/CiscoTransportManagerServer/bin/prune_ne.sh
%CTM_UNIX_group hostname=(root) NOPASSWD: /usr/bin/prune_pm.sh
%CTM_UNIX_group hostname=(root) NOPASSWD: /opt/CiscoTransportManagerServer/bin/prune_pm.sh
%CTM_UNIX_group hostname=(root) NOPASSWD: /usr/bin/prune_fm.sh
%CTM_UNIX_group hostname=(root) NOPASSWD: /opt/CiscoTransportManagerServer/bin/prune_fm.sh
%CTM_UNIX_group hostname=(root) NOPASSWD: /usr/bin/prune_audittrail.sh
%CTM_UNIX_group hostname=(root) NOPASSWD:
/opt/CiscoTransportManagerServer/bin/prune_audittrail.
%CTM_UNIX_group hostname=(root) NOPASSWD: /usr/bin/prune_errlog.sh
%CTM_UNIX_group hostname=(root) NOPASSWD:
/opt/CiscoTransportManagerServer/bin/prune_errlog.
%CTM_UNIX_group hostname=(root) NOPASSWD: /usr/bin/prune_auditlog.sh
%CTM_UNIX_group hostname=(root) NOPASSWD:
/opt/CiscoTransportManagerServer/bin/prune_auditlog.
%CTM_UNIX_group hostname=(root) NOPASSWD: /usr/bin/getinfo.sh
%CTM_UNIX_group hostname=(root) NOPASSWD: /opt/CiscoTransportManagerServer/bin/getinfo.sh
%CTM_UNIX_group hostname=(root) NOPASSWD: /usr/bin/opticalctl status
```

```
%CTM_UNIX_group hostname=(root) NOPASSWD: /opt/CiscoTransportManagerServer/bin/opticalctl
status
%CTM_UNIX_group hostname=(root) NOPASSWD: /usr/bin/opticalctl stop
%CTM_UNIX_group hostname=(root) NOPASSWD: /opt/CiscoTransportManagerServer/bin/opticalctl
stop
%CTM_UNIX_group hostname=(root) NOPASSWD: /usr/bin/opticalctl abort
%CTM_UNIX_group hostname=(root) NOPASSWD: /opt/CiscoTransportManagerServer/bin/opticalctl
abort
%CTM_UNIX_group hostname=(root) NOPASSWD: /usr/bin/opticalctl start
%CTM_UNIX_group hostname=(root) NOPASSWD: /opt/CiscoTransportManagerServer/bin/opticalctl
start
```
