Installing and Maintaining Gateway Geographical Redundancy

The following topics provide procedures for setting up, installing, and maintaining the gateway geographical redundancy solution. Geographical redundancy is configured and monitored using Oracle Active Data Guard (ADG) for geographical redundancy. This chapter explains. how to install Prime Network Operations Reports and the Prime Network Integration Layer (PN-IL) with gateway geographical redundancy and the recommended procedures to upgrade Prime Network in Geographical redundancy setup without the downtime.

Note Gateway high availability is supported only when the gateway software, Oracle database, and Infobright database (applicable for Operations Reports) are installed on the same server.

Also, you can upgrade Prime Network in Geographical redundancy without the network downtime.

This chapter covers the following topics:

Before proceeding with this chapter, make sure you have read Geographical Redundancy Functional Overview, page 2-5.

Steps for Installing the Geographical Redundancy Solution

Table 4-1 lists the steps you must follow to prepare for an installation, perform an installation and verify an installation of the Prime Network gateway geographical redundancy solution. The standby P2 node is only relevant if you are installing geographical + local redundancy. An **x** means you must perform the step *on that server.*

Note The steps in the following table area based on these assumptions:

- For geographical redundancy *only*: Node P1 is the active node and has the primary database. (Installation prompts for geographical redundancy *only* are provided in Table 4-4 on page 4-8.)
- For geographical + local redundancy: Node P1 has the primary database. The local site will also have a standby node (P2); it should be configured as described in is the local redundancy standby node. (The installation prompts for geographical + local redundancy are provided in Table 4-5 on page 4-10.)

Table 4-1 Steps for Setting Up and Installing Geographical Redundancy

			Local		Remote
			Primary Node P1[1]	Standby Node P2[2]	DR NodeS1
Step 1	Collect the server details so that you have all information handy prior to installation.	• Prime Network Virtual IP address • Oracle IP address • Oracle virtual IP address for Local HA /Geo+local HA • Node1, Node 2, DR Node Hostname and IP address.	x	x	x
Step 2	Verify that the servers meet the prerequisites.	Installation Requirements for Geographical Redundancy, page 4-4	x	x	x
Step 3	Configure the server hardware. **Note** If your setup contains primary and a remote site, make sure the remote site is the replica of the primary site.	• Geographical and local redundancy: If you have dual-node cluster configured at the primary site, see Configuring Hardware and External Storage for Red Hat Cluster Site, page 3-8. • Geographical redundancy only: See the gateway hardware requirements in the *Cisco Prime Network 5.1 Installation Guide*.	x	x	x
Step 4	Install the RHEL and all recommended patches on the servers.	Installing RHEL and Verifying the Version, page 3-9	x	x	x
Step 5	Install the RPMs required on Red Hat for Prime Network. If you are installing Operations Reports, be sure to check this section.	Installing RPMs Required on Red Hat for Prime Network, page 3-9	x	x	x

Table 4-1 Steps for Setting Up and Installing Geographical Redundancy (continued)

			Local		Remote
			Primary Node P1[1]	Standby Node P2[2]	DR NodeS1
Step 6	Configure disk groups, volumes, and partitions. If you are installing Operations Reports, be sure to check the required volume sizes.	Configuring Disk Group and Volumes, page 3-11	x	x	x
Step 7	Mount the installation files (in the same directory on both nodes).	—	x	x	x
Step 8	Verify that all nodes are ready for installation by checking disk access, Linux versions, and NTP synchronization.	Verify That All Servers Are Ready for Installation, page 3-12	x	x	x
Step 9	Configure the disk partitions.	Configuring Disk Group and Volumes, page 3-11	x	x	x
Step 10	Mount the external shared storage, Oracle, and Prime Network mount points on the relevant directories.	Creating the Mount Points for Installation, page 3-13	x	x	—
Step 11	Back up the /etc/host and root cron jobs files (the installation software will modify them).	—	x	x	x
Step 12	(Local + geographical) For cluster node makes sure the specified resources are configured to start automatically each time the machine is rebooted.	Configure the Resources for Automatic Start After Reboot, page 3-14	x	x	—
Step 13	(Local + geographical) Stop the RHCS services. **Note** Except for RHEL 7.2 and above versions, all other earlier RHEL versions are supported.	Stopping the RHCS Services, page 3-14	x	x	x
Step 14	Install the server and Oracle database using **install_prime_HA.pl**.	Installing the Prime Network Gateway Geographical Redundancy Software, page 4-6	x	—	—
Step 15	Configure the embedded database (using the **add_emdb_storage.pl -ha** script).		x	—	—
Step 16	Configure the remote site (S1) (execute **setup_prime_DR.pl**)		x	—	x
Step 17	If desired, install any new device packages so that you have the latest device support.	*Cisco Prime Network 5.1 Release Notes*	x	x	—
Step 18	Verify the installation.	Verifying the Geographical Redundancy Setup, page 4-14	x	x	x

Table 4-1 Steps for Setting Up and Installing Geographical Redundancy (continued)

			Local		Remote
			Primary Node P1[1]	Standby Node P2[2]	DR NodeS1
Step 19	(Optional) Install PN-IL	Installing and Configuring PN-IL for Local + Geographical Redundancy, page 4-20	x	—	x
Step 20	(Optional) Setup RHCS Web GUI if it is not configured during installation.	Configuring the RHCS Web Interface (Optional), page 3-25	x	—	—
Step 21	(Only for NAT) Update the database host.	Updating the Database Host in the Registry (Only for NAT), page 3-24	x	x	x
Step 22	(Local + geographical HA only) (Optional) Setup RHCS Web GUI if it is not configured during installation.	Configuring the RHCS Web Interface (Optional), page 3-25	x		—

1. P1 node has primary database (geographical redundancy *only*, or geographical + local redundancy).
2. P2 node is only relevant if local redundancy is also installed.

Installation Requirements for Geographical Redundancy

These topics list the prerequisites for installing gateway geographical redundancy:

- Hardware and Software Requirements for Geographical Redundancy, page 4-4
- Ports Usage for Geographical Redundancy, page 4-5

Hardware and Software Requirements for Geographical Redundancy

Table 4-2 shows the core system requirements for geographical redundancy. All the hardware and software requirements are also applicable for virtual machines. Geographical redundancy requires a Prime Network embedded database and does not support IPv6 gateways or databases. If your high availability deployment differs from these requirements, please contact your Cisco account representative for assistance with the planning and installation of high availability.

Note Geographical redundancy for PN-IL is only supported if the local redundancy solution is also installed.

If you are installing both local and geographical redundancy, for the local redundancy site, refer to the requirements in Hardware and Software Requirements for Local Redundancy, page 3-5.

Table 4-2 System Requirements for Geographical Redundancy[1]

Area	Requirements
Operating System	RHEL 6.7, RHEL 6.8, RHEL 6.9 and RHEL 7.4 64-bit Server Edition (English language).
Oracle	12.1.0.2. Oracle 12.1.0.2 is included in the Prime Network embedded database installation.

Table 4-2 System Requirements for Geographical Redundancy[1] (continued)

Area	Requirements
Hardware	RHEL 6.7, RHEL 6.8, RHEL 6.9 and RHEL 7.4 certified platform. For recommended hardware for small, medium and large networks, see the *Cisco Prime Network 5.1 Installation Guide*.
Network	• Gateway and database should use logical IP addresses which are different between two sites (the sites can be on different subnets). **Note** If you are using the **network-conf** script, when you are prompted for the IP address of units, use the floating IP address of the gateway. • A SSH connection between all nodes is required. • Port 1521 must be open between all nodes to allow ADG data to transfer between the primary and standby database. • IP reachability to the primary site. • SSL connectivity to primary site. For SSL, generate SSL keys and copy to all nodes in primary site. • If you use LDAP authentication in a geographical redundancy configuration, the gateway servers must be configured to communicate with two different LDAP servers, one at the local site and one at the remote site. For this reason the switchover and failover utilities will prompt you for the relevant LDAP parameters. The LDAP parameters are set once using Prime Network Administration. If for some reason the necessary IP addresses are not updated after a switchover or failover, you can set them manually (which includes setting the necessary LDAP parameters). See Changing the Gateway IP Address on a Gateway and All Units (changeSite.pl), page 5-15. For more information on using LDAP for user authentication, see Using an External LDAP Server for Password Authentication in the *Cisco Prime Network 5.1 Administrator Guide*.
Storage	Based on requirements determined by the *Cisco Prime Network Capacity Planning Guide*. To obtain a copy of *Capacity Planning Guide*, contact your Cisco representative. Geographical redundant storage should have the same capacity and mount points as the local site.
File system	ext3
Disk space	5 GB under /tmp is required for installation
rsync	The rsync utility must be installed on all servers that are part of the geographical redundant solution.
scp	The scp program must be installed on all servers that are part of the geographical redundant solution.

1. Virtual machine and bare metal requirements for hard disk, memory, and processor are same. Refer to the *Cisco Prime Network 5.1 Installation Guide* for memory and processor requirements.

Ports Usage for Geographical Redundancy

In addition to the ports listed in the *Cisco Prime Network 5.1 Installation Guide*, the following ports must be free.

You can check the status of the listed ports by executing the following command:

```
# netstat -tulnap | grep port-number
```

To free any ports, contact your system administrator.

Table 4-3 Additional Ports Required for Local Redundancy

Port No.	Used for:
9096	Prime Network cluster web interface

Preparing to Install Geographical Redundancy

There are a number of pre installation steps you need to perform before you install the geographical redundancy solution. These steps are similar to those for local redundancy, except that you are performing them on the primary server (P1) and the remote DR server (S2). These steps include the following:

- Configuring the server hardware, disk groups, volumes, and partitions
- Installing RHEL and the recommended patches and RPMs
- Mounting the installation files, and creating the mount points for the external shared storage, Oracle, and Prime Network
- Backing up your deployment

Extra steps are included if you are using both geographical *and* local redundancy. The preparation procedures are in Table 4-1 on page 4-2, starting with Steps 3. Some procedures will refer you to the instructions for local redundancy; this is because the steps are identical but are performed on the primary node (P1) and the remote DR node (S1) instead of the primary and secondary cluster nodes (P1 and P2).

Installing the Prime Network Gateway Geographical Redundancy Software

The geographical redundancy solution uses a remote site that contains a single server that provides failover in case of a failure at the primary site. It is installed using **install_prime_HA.pl** script that is available in RH_ha.zip file in the installation DVD as described in Installation DVDs, page 1-1.

You can use this procedure to:

- Install the geographical redundancy software only on a remote server (S1 in Figure 2-4 on page 2-6)
- Install the geographical redundancy software on a deployment that is also using local redundancy (P1, P2, S1 in Figure 2-4 on page 2-6)

You can run the installation in interactive or in non-interactive mode. Interactive mode installation prompts you to enter the gateway HA data values one at a time. The Prime Network installer then updates the auto_install_RH.ini file template, which populates the **install_Prime_HA.pl** script.

Note It is recommended you run the installation in interactive mode first to populate the auto_install_RH.ini template with the user input. This gives you the ability to verify the input and run the installation again in non-interactive mode, if needed.

Alternatively, you can enter all the installation values in the auto_install_RH.ini template, located in the RH_ha directory, then run the installation in non-interactive mode. The installation mode is determined by the presence or absence of the **-autoconf** flag.

Note The geographic redundancy configuration takes time. Depending on the speed of the local and remote site connection and size of the database, the configuration can take several hours.

To set up and configure the geographical redundancy site:

Step 1 Change to root user, then **unzip the RH_ha.zip** file located on the installation DVD in the **/tmp** path.This is a mandatory process to unzip the **RH_ha** file in the **/tmp/RH_ha** directory.

Note If you are running the Korn shell (/bin/ksh) and the prompt is the hash tag (#), the installation will fail. Run the installation script using bash.

Step 2 From the /tmp/RH_ha directory, run the **install_Prime_HA.pl** in interactive or non-interactive mode.

Step 3 If you are using Pacemaker Corosync cluster setup, you need to manually perform the pacemaker configuration for geographical + local redundancy first before you proceed with the Prime Network installation, else skip to step 4. For more information, see the Configuring Clusters for Pacemaker and Coresync Setup section in the *Prime Network 5.1 Installation Guide*.

Step 4 Depending on whether you want to configure geographical + local redundancy or geographical redundancy only, do one of the following for the prompts shown in Table 4-4 or Table 4-5:

- For geographical redundancy only, enter:

  local HA= no, DR= yes.

- For local + geographical redundancy, enter:

  local HA= yes, DR= yes.

Step 5 Execute the **install_Prime_HA.pl** script in interactive or non-interactive method.

- **For Interactive Installation**:

  For interactive installation, execute the following commands:

  ```
  cd /tmp/RH_ha
  perl install_Prime_HA.pl
  ```

  See Table 4-4 or Table 4-5 for descriptions of parameters you will be asked to enter at various stages of the interactive installation.

- **For Non-Interactive Installation (Automatic)**:

  a. Edit the auto_install_RH.ini file template found under the RH_ha directory with all of the installation details.

  b. Run the following command:

  ```
  cd /tmp/RH_ha
  perl install_Prime_HA.pl  -autoconf auto_install_RH.ini full path
  ```

  Note To prevent a security violation, it is highly recommended to remove the password in auto_install_RH.ini file after the successful installation.

After the **install_Prime_HA.pl** script is completed, Prime Network gateway and embedded database are installed on the remote site.

The following tables describe the installation prompts, depending on your deployment:

- Table 4-4, Installation Prompts for Geographical Redundancy Only (this deployment is not supported for PN-IL)
- Table 4-5, Installation Prompts for Local and Geographical Redundancy

Table 4-4 Installation Prompts for Geographical Redundancy Only

Prompt for.	Enter...	Notes
Configure local HA	no	Enter **no**; this procedure is for geographical redundancy *alone*. To install geographical redundancy with local redundancy, see Table 4-5. To install local redundancy, see Installing and Maintaining Gateway Local Redundancy, page 3-1
Configure DR	yes	—
Configuring NTP on the 2 gateways	yes | no	**yes** or **no** depending on whether NTP should be configured on two gateways. If not configured, first configure NTP and then continue with the installation. For more details on procedures, see configuring NTP in the *Cisco Prime Network 5.1 Installation Guide*.
OS user of the database	oracledb	Oracle installation owner (default is oracle).
Oracle file system mount point	Example:/opt/ora/oracle	Location of the mount point given for the *oracle-home*/*oracle-user*.
Configure another oracle file system mount	no	**yes** or **no** value indicating whether you want to use the default Oracle mount point or not.
Home directory of the OS user of the database	Example:/opt/ora/oracledb	OS user home directory (default is /opt/ora/oracledb).
Oracle database redolog location	Example:/opt/ora/oracledb/redo	Location of the database redologs. Should be located under one of the Oracle mounts but not directly on the mount, and should be compliant with the storage requirements.
Oracle database data files location	Example:/opt/ora/oracledb/oradata /anadb	Location of the database data files. Should be located under one of the Oracle mounts but not directly on the mount, and should be compliant with the storage requirements.
Oracle database backup location	Example:/opt/ora/oracledb/backup	Location of the database backup files. Should be located under one of the Oracle mounts but not directly on the mount, and should be compliant with the storage requirements.
Oracle database archive location	Example:/opt/ora/oracledb/arch	Location of the database archive files. Should be located under one of the Oracle mounts but not directly on the mount, and should be compliant with the storage requirements.
Prime Network OS user	*pnuser*	User-defined Prime Network OS user (*pnuser*). Username must start with a letter and contain only the following characters: [A-Z a-z 0-9].

Table 4-4 Installation Prompts for Geographical Redundancy Only (continued)

Prompt for.	Enter...	Notes
Prime Network file system mount point	Example: /export/home/ana	Location of the mount point for Prime Network.
Home directory of the Prime Network user	Example: /export/home/ana/pn50	Directory should be located under *Prime Network file system mount point* but *not* the mount point itself.
Prime Network user password	*password*	User-defined password for the *pnuser*.
Location of the Prime Network installation file	Example: /dvd/Server	Mount point of Prime Network installation. Should be the same for all relevant nodes. Example: For **install.pl** the path will be /dvd/Server.
Directory for the Oracle zip files	Example: /opt/ora/oracle_zip	Directory containing the embedded Oracle zip files. Can be a temporary location where the files were copied from the installation DVDs; or directly specify the location on DVD.
Node one password	node1 password	Root user password for the node running the installation. For local redundancy dual-node clusters, this node must be one of the cluster nodes.
DR node name	DR hostname	For geographic redundancy, hostname for the remote site (the value returned by the system call hostname).
DR node password	DR node password	For geographic redundancy, root user password for the remote site.
DB profile	The number corresponding to the DB profile required.	Select from 1-7 (estimated DB profile).
Password for 5 built-in users	password	Password for Prime Network root, bosenable, bosconfig, bosusermngr, and web monitoring users (users for various system components). Passwords must contain: • Contain at least eight alphanumeric characters. • Contain upper and lower case letters. • Contain one number and one special character. • Cannot contain: @ / ! $ ~ * ( ) - + = [{
SMTP server	Example: outbound.cisco.com	Local e-mail server.
User email	email address	E-mail address to which embedded database will send error messages.

Table 4-4 Installation Prompts for Geographical Redundancy Only (continued)

Prompt for.	Enter...	Notes
Run database backups?	Y/N	Whether to enable embedded database automated backups.
Public network interface	Example: eth0	Name of network interface to which logical IPs will be added. Must be identical on all servers (for example: eth0, bge0).

Table 4-5 shows the installation prompts when setting up local and geographical redundancy.

Table 4-5 Installation Prompts for Local and Geographical Redundancy

Prompt for.	Enter...	Notes
Configure local HA?	yes	Enter **yes**; this procedure is for geographical redundancy + local redundancy. To install geographical only, see Table 4-4. To install local redundancy, see Installing and Maintaining Gateway Local Redundancy, page 3-1
Configure DR?	yes	—
Is NTP configured on the 3 gateways (local and remote)?	yes	**yes** or **no** depending on whether NTP should be configured on three gateways. If not configured, first configure NTP and then continue with the installation. For more details on procedures, see configuring NTP in the *Cisco Prime Network 5.1 Installation Guide*.
OS user of the database	oracledb	Oracle installation owner (default is oracle).
Configuring multipath	no	Answer **yes** if the node is connected to storage with more than one connection (recommended).
Oracle file system mount point	Example:/opt/ora/oracle	Location of the mount point given for the *oracle-home*/*oracle-user*.
Configure another oracle file system mount	no	**yes** or **no** value indicating whether you want to use the default Oracle mount point or not.
Home directory of the OS user of the database	Example:/opt/ora/oracledb	OS user home directory (default is /opt/ora/oracledb).
Oracle database redolog location	Example:/opt/ora/oracledb/redo	Location of the database redologs. Should be located under one of the Oracle mounts but not directly on the mount, and should be compliant with the storage requirements.
Oracle database data files location	Example:/opt/ora/oracledb/oradata /anadb	Location of the database data files. Should be located under one of the Oracle mounts but not directly on the mount, and should be compliant with the storage requirements.

Table 4-5 Installation Prompts for Local and Geographical Redundancy

Prompt for.	Enter...	Notes
Oracle database backup location	Example:/opt/ora/oracledb/backup	Location of the database backup files. Should be located under one of the Oracle mounts but not directly on the mount, and should be compliant with the storage requirements.
Oracle database archive location	Example:/opt/ora/oracledb/arch	Location of the database archive files. Should be located under one of the Oracle mounts but not directly on the mount, and should be compliant with the storage requirements.
Prime Network OS user	*pnuser*	User-defined Prime Network OS user (*pnuser*). Username must start with a letter and contain only the following characters: [A-Z a-z 0-9].
Prime Network file system mount point	Example: /export/home/ana	Mount point of Prime Network installation.
Home directory of the Prime Network user	Example: /export/home/ana/pn41	Directory should be located under *Prime Network file system mount point* but *not* the mount point itself.
Prime Network user password	*password*	User-defined password for the *pnuser*.
Location of the Prime Network installation file	Example: /dvd/Server	The mount point of the Prime Network installation. The mount point should be the same for all relevant nodes. Example: For **install.pl** the path will be /dvd/Server.
Directory for the Oracle zip files	Example: /opt/ora/oracle_zip	Directory containing the embedded Oracle zip files. Can be a temporary location where the files were copied from the installation DVDs; or directly specify the location on DVD.
Node one password	node1 password	Root user password for the node running the installation. For local redundancy dual-node clusters, this node must be one of the cluster nodes.
DR node hostname	DR hostname	For geographic redundancy, hostname for the remote site . This is the value returned by the system call hostname.
DR node password	DR node password	For geographic redundancy, root user password for the remote site.
DB profile	The number corresponding to the DB profile required.	Select from 1-7 (estimated DB profile).

Table 4-5 Installation Prompts for Local and Geographical Redundancy

Prompt for.	Enter...	Notes
Password for 5 built-in users	password	Password for Prime Network root, bosenable, bosconfig, bosusermngr, and web monitoring users (users for various system components). Passwords must contain: • Contain at least eight alphanumeric characters. • Contain upper and lower case letters. • Contain one number and one special character. • Cannot contain: @ / ! $ ~ * ( ) - + = [{
SMTP server	Example: outbound.cisco.com	Local e-mail server.
User email	email address	E-mail address to which embedded database will send error messages.
Oracle service IP address	IP address	Logical IP of Oracle service group.
Prime Network service IP address	IP address	Logical IP of Prime Network service group.
Multicast address for the cluster nodes	IP address	An available multicast address accessible and configured for both cluster nodes.
Prime Network cluster name	*username*	User-defined cluster name. Cannot be more than 15 non-NUL (ASCII 0) characters. For local redundancy, cluster name must be unique within the LAN.
Node one fence agent	The number corresponding to the fencing agent required	Type of fencing device configured for the node running the installation. (See Fencing Options, page 2-3.)
Node two fence agent	The number corresponding to the fencing agent required	Type of fencing device configured for the second cluster running the installation. (See Fencing Options, page 2-3.)
Prime Network cluster web interface password	port number and password	Port and the password for cluster web interface. LUCI_PORT must be available and should not be in Prime Network debug range: 60000 <=x< 61000 or in Prime Network AVM port range: 2224 <= *x* < 3000 or 8000 <= *x* < 9000) Password must contain at least 6 characters. **Note** LUCI_PORT is not supported in Pacemaker with RHEL 7.2 configuration.
Prime Network cluster web interface port		
Node one IP	node1 IP address	IP address of the node running the installation. Local redundancy dual-node clusters: Must be one of the cluster nodes.

Table 4-5 Installation Prompts for Local and Geographical Redundancy

Prompt for.	Enter...	Notes
DR node IP	DR node IP address	IP address of DR node at remote site (geographical redundancy).
Run database backups?	Y/N	Whether to enable embedded database automated backups.
Public network interface	Example: eth0	Name of network interface to which logical IPs will be added. Must be identical on all servers (for example: eth0, bge0).
Node one fence hostname	hostname	Hostname of fencing device configured for node running the installation (for some fencing devices, this can be an IP address).
Node one fence login	login name	Login name for fencing device configured for node running the installation.
Node one fence passwd	password	Password for fencing device configured for node running the installation.
Node two fence hostname	hostname	Hostname of fencing device configured for second cluster node (for some fencing devices, this can be an IP address).
Node two fence login	login name	Login name for fencing device configured for second cluster node.
Node two fence passwd	password	Password for fencing device configured for node second cluster node.

Step 6 Configure the Embedded Database by running the **add_emdb_storage.pl** utility and you must include **-ha** flag while running this utility.

a. Log in as prime network user

```
su - pnuser
```

b. Change directories to *NETWORKHOME*/Main/scripts/embedded_db and enter the following command:

```
./add_emdb_storage.pl -ha
```

c. Enter the number corresponding to the estimated database profile that meets your requirement.

d. Insert the event and workflow archiving size in days.

Step 7 Configure the remote site using the **setup_Prime_DR.pl** command in interactive or non-interactive mode. For more information on **setup_Prime_DR.pl** script, see Installation DVDs, page 1-1.

Note The **setup_Prime_DR.pl** script must run on the node running the primary database.

- **For Interactive Installation**:

  For interactive mode, enter the following commands:

```
cd /tmp/RH_ha
perl setup_Prime_DR.pl
```

- **For Non- Interactive Installation (Automatic)**:
  a. Edit the auto_install_RH.ini file template found under the RH_ha directory with all of the installation details.
  b. Run the following command:

```
cd /tmp/RH_ha
perl setup_Prime_DR.pl  -autoconf auto_install_RH.ini full path
```

Example: perl **setup_Prime_DR.pl** -autoconf /tmp/RH_dr/ auto_install_RH.ini

Note If the **setup_Prime_DR.pl** script is executed from the same node as the **install_Prime_HA.pl** script, and if all the parameters are same, you can use the same auto_install_RH.ini file. The prompts and outputs while executing this script are a subset of the install script prompts.

Step 8 Verify the setup as described in Verifying the Geographical Redundancy Setup, page 4-14.

After the **setup_Prime_DR.pl** script is completed:

- The Prime Network and embedded database files are replicated to the remote site.
- All utility scripts are located under /var/adm/cisco/prime-network/scripts/ha/util/.

Verifying the Geographical Redundancy Setup

Table 4-6 shows the geographical redundancy verification tests.

Note The geographical redundancy verification tests are for the embedded database and must be performed by Cisco personnel only.

Table 4-6 Geographical Redundancy Verification Tests

Description	Procedure	Expected Results
Database Replication		

Name: tnsping Test: Primary to remote site
Purpose: Verify tnsping from the primary to the remote site.
	From the primary DB server enter the following as the OS Oracle UNIX user:
	`tnsping anadb`
	`tnsping anadb_sb`
		Verify that the TNS connection on port 1521 is available between the two database servers.

Name: tnsping Test: remote site to Primary
Purpose: Verify tnsping from the remote site to the primary site.
	From the standby database server enter the following as the as Oracle UNIX user:
	`tnsping anadb`
	`tnsping anadb_sb`
		Verify that the TNS connection on port 1521 is available between the two database servers.

Table 4-6 Geographical Redundancy Verification Tests (continued)

Description	Procedure	Expected Results
Name: Get the *pnuser_admin* Password **Purpose**: Get the *pnuser_admin* login password from the registry for later tests.	As the Prime Network UNIX user, enter: **cd** *NETWORKHOME*/**Main** **./runRegTool.sh localhost get persistency/nodes/admin/PASS**	Derive the password for *pnuser_admin* database user from the registry for creating db_links.
Name: Replication Test **Purpose**: Verify the object and data replication.	1. On the primary database server, connect to sqlplus as *pnuser*_admin, then enter the following: **CREATE TABLE NETWORK_TEST_REP (NUM NUMBER);** **INSERT INTO NETWORK_TEST_REP VALUES(1);** **COMMIT;** **ALTER SYSTEM SWITCH LOGFILE;** 2. On the standby database server, connect to sqlplus as *pnuser*_admin and query this table: **SELECT * FROM NETWORK_TEST_REP;**	The table and data are replicated
Name and Purpose: Create Database Links on the Primary Database **Note** Perform this step once, after installing RHEL. Do not repeat this step when verifying the setup after a switchover or failover.	Connect to sqlplus as the *pnuser*_admin, then enter the following: **CREATE DATABASE LINK TO_anadb_sb CONNECT TO *pnuser*_ADMIN IDENTIFIED BY** *pnuser_admin_password* **USING 'anadb_sb';** **CREATE DATABASE LINK TO_anadb CONNECT TO *pnuser*_ADMIN IDENTIFIED BY** *pnuser_admin password* **USING 'anadb';**	The database link is created.
Name: Query Replication SCN Gap. **Purpose**: Verify that an SCN gap is not growing between the two databases.	1. Connect to sqlplus as *pnuser*_admin. 2. Run the following query several times to verify gap is not growing: **with v1 as (select current_scn anadb_sb_SCN from v$database@TO_anadb_sb), v2 as (select current_scn anadb_SCN from v$database@TO_anadb)** **select v1.anadb_sb_SCN anadb_sb_SCN,v2.anadb_SCN anadb_SCN,v1.anadb_sb_SCN-v2.anadb_SCN "SCN GAP" from v1,v2;**	Run the query several times to verify the gap is not growing The SCN gap should be less than 100,000.
Name: Replication is running **Purpose**: Verify the file replication process is running correctly by checking the monitoring log files under the Prime Network home directory.	Check the following log files under *NETWORKHOME*. • *NETWORKHOME*/.replication—A time stamp file is created on the primary Prime Network node. • *NETWORKHOME*/.replication_remote—A time stamp file is created on the primary Prime Network node and replicated to the remote Prime Network node and back again. This will hold the time stamp of the last Prime Network file replication. • *NETWORKHOME*/.replication_log—Log file created by the Prime Network replication monitoring. It will be empty if all is considered OK (the difference between the time stamp files is within range). • *NETWORKHOME*/oracle_monitor.log—Remote database monitoring log.	The replication is running correctly.

Table 4-6 Geographical Redundancy Verification Tests (continued)

Description	Procedure	Expected Results
File Replication		
Name: File replication **Purpose**: Verify the file replication process.	1. Create a file under *NETWORKHOME* by entering: `touch filename` 2. Verify that the file is created on the geographical remote node. 3. Remove the file and verify that the file is removed on the remote node.	The file is created and removed. **Note** File replication from primary to geographical remote node takes some time.
Name: Replication is running **Purpose**: Verify the file replication process is running correctly by checking the monitoring log files under the Prime Network home directory.	Check the following log files under NETWORKHOME. • *NETWORKHOME*/.replication—A time stamp file is created on the primary Prime Network node. • *NETWORKHOME*/.replication_remote—A time stamp file is created on the primary Prime Network node and replicated to the remote Prime Network node and back again. This will hold the time stamp of the last Prime Network file replication. • *NETWORKHOME*/.replication_log—Log file created by the Prime Network replication monitoring. It will be empty if all is considered OK (the difference between the time stamp files is within range). • *NETWORKHOME*/oracle_monitor.log—Remote database monitoring log.	The replication is running correctly.
Key Files for Geographical Redundancy		
Name: Checking the key files under Prime Network and Oracle home directories. **Purpose**: Verify that the both the remote site and primary sites are properly marked with key files under the Prime Network and oracle home directories.	Check the following files under NETWORKHOME (Prime Network Home directory) and Oracle home directories. • .local_ana • .remote_ana • .local_db • .remote_db	Key files should be under Prime Network and Oracle home directory.

Maintaining Geographical Redundancy

These topics provide information pertaining to ongoing management of an ADG geographical redundancy configuration. The utilities used for these operations are stored in /var/adm/cisco/prime-network/scripts/ha/util.

This section includes:

Checking Log Messages

Prime Network generates the following system events for geographical redundancy monitoring:

- **Informational event** to indicate that both ADG and GWSync monitoring is active. This is done on an hourly basis based on cron jobs.
- **Critical events** when the following occur:
  - An GWSync has not occurred in the last 10 minutes.
  - The standby database is down.
  - The standby database is up but has been out of sync for 60 minutes.

The log files for data replication are described in the following table. To troubleshoot problems with the replication process, see Verifying the Geographical Redundancy Setup, page 4-14.

Log File	Description
NETWORKHOME/.replication *NETWORKHOME*/.replication_remote	Contains the local and remote timestamps used by GWSync.
NETWORKHOME/.replication_log	This log is only populated if the GWSync local and remote timestamps are more than 10 minutes apart (and a System event is generated), as in the following example: `Replication failed since: date`

NETWORKHOME/oracle_monitoring.log	Information on the Redo-apply log from the standby server.
	`+ Testing the replication state on the remote database`
	
	`- Redo transport lag:`
	`NAME VALUE TIME_COMPLETED`
	`---------- ---------- ----------`
	`transport lag +00 00:00:00 04/14/2013 10:30:34`
	
	`- Redo apply lag:`
	`NAME VALUE TIME_COMPLETED`
	`---------- ---------- ----------`
	`apply lag +00 00:00:00 04/14/2013 10:30:35`
	
	`- Active apply rate:`
	`ITEM UNITS SO FAR`
	`---------- ----------`
	`Active Apply Rate KB/sec 286`
	
	`- Data base role: PHYSICAL STANDBY`

Monitoring Overall Status

The **primeha** command is a central utility for checking the status of the high availability nodes, performing switchovers and failovers, and stopping and resuming data replication.

Use the following command to view the status of the cluster:

```
perl primeha -status
```

The below output is an example for a network that has both local and geographical redundancy.

- The first portion of the output as shown below, shows the status of the geographical redundancy configuration. The server hostname1.cisco.com is the remote gateway and database server. The server hostname2.cisco.com is the other node in the local redundancy cluster and is not running any service.

```
- Installing Perl-5.16.0-x86_64-linux-thread-multi
  Log can be found at
/var/adm/cisco/prime-network/scripts/ha/util/perlForHA/installPerlForHA-1365070277.log


HOST                  ANA SERVICE                                ORACLE SERVICE
hostname.cisco.com    Active Prime Network                       Active oracle    local
hostname1.cisco.com   Standby Prime Network                      Standby oracle
hostname2.cisco.com   Prime Network not running on this node     oracle not running on
this node
```

- The second portion of the output as shown below (that begins with Cluster Status) shows the status of the local redundancy configuration. (This is displayed because this setup also contains a local redundancy configuration.)

```
Cluster Status for ana_cluster @ Mon Aug  1 12:34:40 2013
Member Status: Quorate

 Member Name            ID              Status
 ------ ----            ----            ------
 hostname.cisco.com     1               Online, Local, rgmanager
 hostname2.cisco.com    2               Online, rgmanager

 Service Name            Owner (Last)            State
 ------- ----            ----- ------            -----
 service:ana             hostname.cisco.com      started
 service:oracle_db       hostname.cisco.com      started
```

- In case of Pacemaker and Corosync setup, the output shown below (that begins with PCs Status) displays the status of the Pacemaker cluster. (This is displayed because this setup also contains a local redundancy configuration.)

```
@pn50-qa2-ha-01 /]# pcs status
er name: hacluster
: corosync
nt DC: pn50-qa2-ha-01 (version 1.1.15-11.el7_3.5-e174ec8) - partition with quorum
updated: Tue Nov 28 09:22:00 2017          Last change: Mon Nov 27 13:46:11 2017 by hacluster via crmd on pn50-qa2-

es and 10 resources configured

e: [ pn50-qa2-ha-01 pn50-qa2-ha-02 ]

list of resources:

urce Group: Oracle
oracle_vip (ocf::heartbeat:IPaddr2):       Started pn50-qa2-ha-02
oracle_fs1 (ocf::heartbeat:Filesystem):    Started pn50-qa2-ha-02
oracle_fs2 (ocf::heartbeat:Filesystem):    Started pn50-qa2-ha-02
oracle_fs3 (ocf::heartbeat:Filesystem):    Started pn50-qa2-ha-02
listener   (lsb:lsnr.sh):  Started pn50-qa2-ha-02
oracle_db  (lsb:oracle_db.sh):     Started pn50-qa2-ha-02
urce Group: PrimeNetwork
pn_vip     (ocf::heartbeat:IPaddr2):       Started pn50-qa2-ha-01
pn_fs1     (ocf::heartbeat:Filesystem):    Started pn50-qa2-ha-01
pn (lsb:pn.sh):    Started pn50-qa2-ha-01
pnil       (lsb:pcil.sh):  Started pn50-qa2-ha-01

n Status:
osync: active/enabled
emaker: active/enabled
d: active/enabled
@pn50-qa2-ha-01 /]#
```

Uninstalling the Geographical Redundancy Software

To uninstall geographical redundancy, use this procedure. If Operations Reports was also installed, this procedure will remove it.

If your deployment also has local redundancy, uninstall the software on the primary cluster server (P1) first using the procedure in Uninstalling Local Redundancy, page 3-30.

Step 1 If any RHCS services are running, log into the primary cluster server and freeze the relevant services (service can be **ana**, **oracle**, and, if Operations Reports is installed, **ifb**).

clusvcadm -Z *service*

Step 2 Log in as the root user and change to the following directory:

cd /var/adm/cisco/prime-network/reg/*pnuser*

Step 3 Enter the following command:

perl uninstall.pl

Installing and Configuring PN-IL for Local + Geographical Redundancy

This section explains how to install the Prime Network Integration Layer (PN-IL) 1.2 for a local + geographical redundancy deployment. It also explains how to integrate the deployment with Cisco Prime Central. For information on the Prime Central releases with which you can integrate PN-IL 1.2, see the *Cisco Prime Network 5.1 Release Notes*.

These topics provide the information you will need to install and configure PN-IL geographical, and local redundancy:

If you want to migrate an *existing* standalone installations of PN-IL (local + geographical) to suite mode, you can use the procedure in Configuring and Migrating PN-IL with Prime Central (Suite Mode with Local + Geographical Redundancy), page 4-24.

Installation DVD

The PN-IL high availability files are provided on the Prime Network installation DVD named **Disk 1: New Install DVD**. **Disk 2** contains the tar file **sil-esb-1.2.0.tar.gz**, which contains the PN-IL installation files and scripts, including:

- installAndConfigureESB.sh—PN-IL installation script
- itgctl—PN-IL configuration script
- il-watch-dog.sh—PN-IL health monitor control script
- DMSwitchToSuite.sh—Script to migrate to suite

Steps for Installing PN-IL with Local + Geographical Redundancy

Table 4-7 provides the basic steps you must follow to set up local + geographical redundancy for PN-IL. If you want to migrate an *existing* standalone installations of PN-IL (local + geographical) to suite mode, you can use the procedure in Configuring and Migrating PN-IL with Prime Central (Suite Mode with Local + Geographical Redundancy), page 4-24.

Note that you only have to install PN-IL on the primary cluster server (P1), not on the remote (DR) server (S2). However, you will have to do some configuration tasks on the remote server.

Table 4-7 Steps for Setting Up PN-IL Local + Geographical Redundancy

	Task	Topic/Action Required	Local Cluster		Remote (DR) Server
			Server (P1) (has Primary database)	Server (P2)	Remote Server (S1)
Step 1	Collect server details, so that you have all information handy prior to installation.	• Virtual IP address of P1 • IP Address of remote DR server S1 • Prime Network application root username and password for primary cluster and remote DR servers (P1 and S1) • URL for authenticating Prime Network calls for P1 and S1 (normally **https://localhost:6081/ana/services/userman**) • ((Suite mode) For the Prime Central server where Oracle is installed: Hostname, database service name, database username and password, and database port.	x	—	—
Step 2	Verify the server meets the prerequisites.	Installation Requirements for Geographical Redundancy, page 4-4	x	—	—
Step 3	Freeze RHCS and install PN-IL.	Installing PN-IL on a Prime Network Server (Local + Geographical Redundancy), page 4-21	x	—	—
Step 4	Configure PN-IL (in standalone or suite mode) on both nodes, and unfreeze RHCS.	Configuring PN-IL on a Prime Network Gateway (Local + Geographical Redundancy), page 4-23	x	—	x
Step 5	Disable the PN-IL Health Monitor.	Disabling the PN-IL Health Monitor, page 4-27	x	—	x

Installing PN-IL on a Prime Network Server (Local + Geographical Redundancy)

Use this procedure to install PN-IL with local + geographical redundancy on the primary cluster server (P1). The primary cluster node will copy the necessary files to the remote DR node (S1). For the remote DR node, you only have to perform some minor configurations.

Before You Begin:

Make sure Prime Network is installed and is up and running on the both the primary cluster node (P1) and the remote DR node (S2). In the following procedure, $ANAHOME is the *pnuser* environment variable for the Prime Network installation directory (/export/home/*pnuser* by default).

Step 1 On the primary cluster node (P1), log in as root and freeze the ana service.

Note The cluster server should be the active node where the ana service is running.

```
ssh root@active-cluster-node
clusvcadm -Z ana
```

Step 2 On the remote DR node (S1), log in as root and save your rsync settings so they are not overwritten during the PN-IL installation process.

```
ssh root@remote-DR-node-name
cd /var/adm/cisco/prime-network/scripts/ha/rsync
mv rsync_exclude_pnil.txt rsync_exclude_pnil.txt.org
mv rsync_exclude_pnil_cfg.txt rsync_exclude_pnil_cfg.txt.org
```

Step 3 On the primary cluster node (P1), log in as *pnuser*.

```
su - pnuser
```

For example:

```
su - pn41
```

Step 4 On the primary cluster node, create an installation directory for PN-IL.

```
mkdir -p $ANAHOME/new-pnil-dir
```

For example, if the Prime Network installation directory was /export/home/pn41, you would run this command to create an installation directory called pnil:

```
mkdir -p $ANAHOME/pnil
```

Step 5 On the primary cluster node (P1), copy the installation files from the installation DVD, extract them, and start the installation script. These examples use the PN-IL installation directory /pnil.

a. Copy the PN-IL installation tar file from Disk 2 to the directory you created in Step 4. In the following example, the installation directory is named **pnil**.

```
cp /tmp/sil-esb-1.2.0.tar.gz $ANAHOME/pnil
```

b. Change to the directory you created in Step 4 and extract the files from the PN-IL installation tar:

```
cd $ANAHOME/pnil
tar -zxf sil-esb-1.2.0.tar.gz
```

c. Change to directory where the installation tar files were extracted and run the installation script:

```
cd sil-esb-1.2.0/install/packages
./installAndConfigureEsb.sh
```

Step 6 On the primary cluster node (P1), reload the user profile.

```
source $ANAHOME/.cshrc
```

Step 7 Log into the remote DR server (S1) as root and move the original rsync exclude file (that you moved in Step 2) back to its proper place.

```
ssh root@remote-DR-server
cd /var/adm/cisco/prime-network/scripts/ha/rsync
mv rsync_exclude_pnil.txt.org rsync_exclude_pnil.txt
mv rsync_exclude_pnil_cfg.txt.org rsync_exclude_pnil_cfg.txt
```

Step 8 Configure PN-IL as described in Configuring PN-IL on a Prime Network Gateway (Local + Geographical Redundancy), page 4-23.

Note Do not unfreeze the ana service until PN-IL has been configured.

Note You do not have to install the geographical redundancy files on the remote server (S1); the necessary files will be copied to the remote DR server by the primary cluster node.

Configuring PN-IL on a Prime Network Gateway (Local + Geographical Redundancy)

Configuration tasks must be performed on both the primary cluster node (P1) and the remote DR node (S1).

- For standalone mode (that is, Prime Network is not integrated with Prime Central), follow the instructions in Configuring PN-IL with Prime Network (Standalone Mode with Local + Geographical Redundancy), page 4-23.
- For suite mode (Prime Network is integrated with Prime Central), follow the instructions in Configuring and Migrating PN-IL with Prime Central (Suite Mode with Local + Geographical Redundancy), page 4-24.

Configuring PN-IL with Prime Network (Standalone Mode with Local + Geographical Redundancy)

In standalone mode, Prime Network is not integrated with Prime Central and can independently expose MTOSI and 3GPP web services to other OSS/applications. In the following procedure:

- $PRIMEHOME is the *pnuser* environment variable for the PN-IL installation directory you created in Installing PN-IL on a Prime Network Server (Local + Geographical Redundancy), page 4-21.
- $ANAHOME is the *pnuser* environment variable for the Prime Network installation directory (/export/home/*pnuser* by default).

Step 1 From the primary cluster node (P1), log in as *pnuser*.

Step 2 On the primary cluster node (P1), configure PN-IL in standalone mode.

```
itgctl config 1 --anaPtpServer ana-cluster-ip --anaPtpUser pn-root-user --anaPtpPw
pn-root-user-password --authURL network-authentication-URL
```

itgctl uses these arguments.

Argument	Description
ana-cluster-ip	• When run on the primary cluster node (P1), this is the IP address of the primary cluster server. • When run on the remote DR node, this is the IP address of the remote DR server.
pn-root-user	Name of Prime Network root user (usually **root**)

Argument	Description
pn-root-user-password	Password for Prime Network root user
network-authentication-URL	URL used to authenticate Prime Network calls (usually **https://localhost:6081/ana/services/userman**)

For example:

```
itgctl config 1 --anaPtpServer 192.0.2.22 --anaPtpUser root --anaPtpPw myrootpassword
--authURL https://192.0.2.22:6081/ana/services/userman
```

Step 3 On the primary cluster node (P1), start PN-IL.

```
$PRIMEHOME/bin/itgctl start
```

Step 4 Open a new session on the remote DR server (S1) and log in as *pnuser*.

Step 5 On the remote DR server (S1), configure PN-IL in standalone mode but use the *remote DR server's IP address* (**--anaPtpServer** *remote-DR-ip*).

itgctl config 1 --anaPtpServer *remote-DR-server-ip* **--anaPtpUser** *pn-root-user* **--anaPtpPw** *pn-root-user-password* **--authURL** *network-authentication-URL*

Step 6 On the primary cluster node (P1), start PN-IL.

```
$PRIMEHOME/bin/itgctl start
```

Note To avoid the automatic start of PN-IL on the DR server, disable the PN-IL Health monitor, and stop the PN-IL service on that server, using the following command: $PRIMEHOME/local/scripts/**il-watch-dog.sh disableandstop**.

Step 7 On the primary cluster node, log in as the operating system root user and unfreeze the ana service.

```
clusvcadm -U ana
```

Step 8 To enable NBI, contact Cisco representative.

Next, perform the necessary configuration steps that are described in Configuring PN-IL on a Prime Network Gateway (Local + Geographical Redundancy), page 4-23.

Configuring and Migrating PN-IL with Prime Central (Suite Mode with Local + Geographical Redundancy)

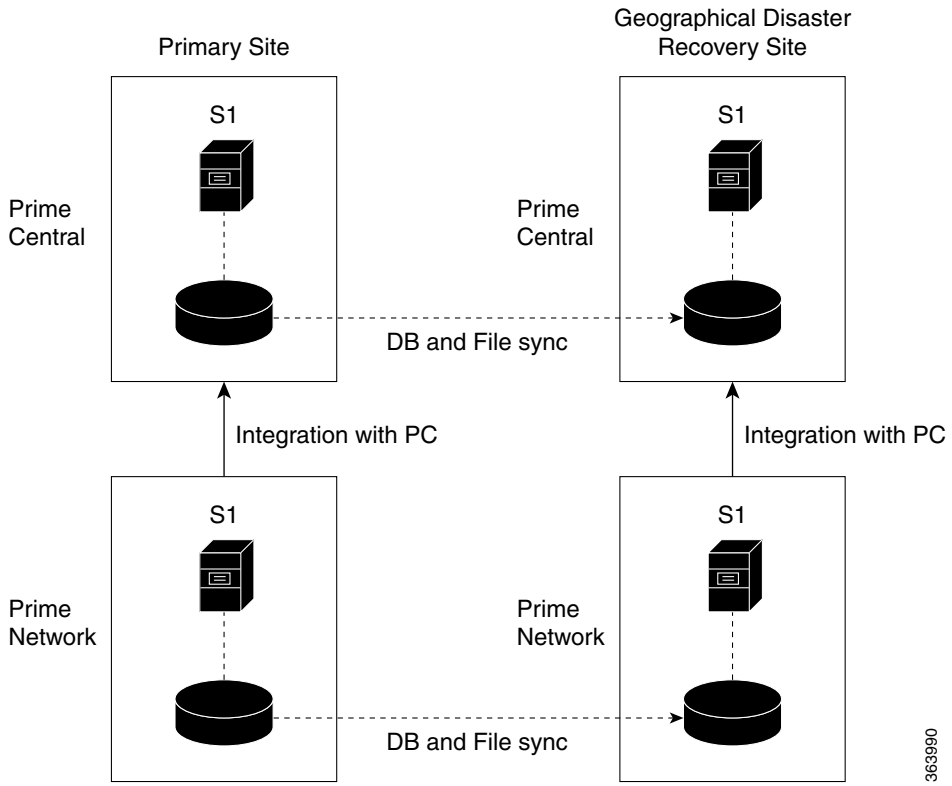
When Prime Network and PN-IL are running in *suite mode*, that means they are integrated with Prime Central. This procedure explains how to integrate PN-IL with a deployment of Prime Central that uses geographical redundancy. You can use this procedure for:

- New installations of PN-IL with geographical redundancy.
- Existing standalone installations of PN-IL with geographical redundancy, that you want to move from standalone to suite mode.

Figure 4-1 illustrates the deployment of both local and geographical redundancy in Suite Mode.

Note PN-IL geographical redundancy is only supported when the deployment also has local redundancy. Therefore, Prime Central must also be using both local and geographical redundancy.

Figure 4-1 Local Redundancy with Geographical Redundancy Suite Mode



In the following procedure, $PRIMEHOME is the *pnuser* environment variable for the PN-IL installation directory you created in Installing PN-IL on a Prime Network Server (Local + Geographical Redundancy), page 4-21.

Before You Begin

Before you begin, verify the following:

- PN-IL is already installed. If it is not, install it as described in Installing and Configuring PN-IL for Local + Geographical Redundancy, page 4-20.
- Prime Network is running suite mode.
- Prime Central is using both local geographical redundancy.

To integrate PN-IL with Prime Central:

Step 1 From the Prime Network primary cluster node (P1), log in as *pnuser*.

Step 2 On the Prime Network primary cluster node (P1), configure PN-IL in suite mode, edit the necessary integration files, and run the integration script:

a. Move to the PN-IL integration directory.

```
cd $PRIMEHOME/integration
```

b. Edit the **ILIntegrator.prop** file and change the value of the 'HOSTNAME' property to ana-cluster-ana, which is the fixed name for the Prime Network cluster server.

```
HOSTNAME=ana-cluster-ana
```

c. Execute the following integration script to integrate PN-IL with Prime Central. Prime Central will assign an ID number to PN-IL. Note the ID number because you will need it later to integrate the remote DR server (S1) with Prime Central.

Note When you run DMIntegrator.sh, you must exactly follow the format below or the script will fail.

./DMIntegrator.sh -a ILIntegrator.prop *prime-central-db-hostname prime-central-db-service-name prime-central-db-user prime-central-db-user-password prime-central-port-number*

DMIntegrator uses these variables. You must enter them in this exact order.

DMIntegrator.sh Variable	Description
prime-central-server-hostname	Specifies the IP address of the Prime Central database server
prime-central-db-service-name	Specifies the name of Prime Central database service
prime-central db-user	Specifies the name of Prime Central database user (usually **primedba**)
prime-central-db-user-password	Specifies the password for Prime Central database user
prime-central-db-port	Specifies the port for Prime Central database (usually **1521**)

Example:

```
./DMIntegrator.sh -a ILIntegrator.prop 10.10.10.10 primedb primedba mypassword 1521
```

Step 3 On the Prime Network primary cluster node (P1), reload the user profile:

```
source $PRIMEHOME/.cshrc
```

Step 4 On the Prime Network primary cluster node (P1), retrieve the ID that Prime Central assigned to Prime Network using **itgctl list.** You will need it in a future step.

```
$PRIMEHOME/bin/itgctl list
```

Step 5 Open a new session to the Prime Network remote DR server (S1) as a root user and rename file as shown below.

```
cd /var/adm/cisco/prime-network/scripts/ha/rsync
mv rsync_exclude_pnil.txt rsync_exclude_pnil.txt.org
mv rsync_exclude_pnil_cfg.txt rsync_exclude_pnil_cfg.txt.org
```

Step 6 On the Prime Network remote DR server (S1), configure PN-IL in suite mode as *pnuser*. Edit the necessary integration files, and run the integration script.

a. su - *pnuser*

b. Move to the PN-IL integration directory.

```
cd $PRIMEHOME/integration
```

c. Edit the **ILIntegrator.prop** file and change the value of the 'HOSTNAME' property to the Prime Network remote DR server (S1) hostname. For example:

```
HOSTNAME=remote-pn-DR-server
```

d. Execute the following integration script to integrate PN-IL into the deployment:

```
./DMIntegrator.sh -a ILIntegrator.prop prime-DR-db-server-hostname db-service-name
db-user db-user-password db-port pn-id
```

DMIntegrator uses these variables. You must enter them in this exact order.

DMIntegrator.sh Variable	Description
prime-DR-db-server-hostname	IP address of the Prime Central DR database server
db-service-name	Name of Prime Central database service
db-user	Name of Prime Central database user (usually **primedba**)
db-user-password	Password for Prime Central database user
db-port	Port for Prime Central database (usually **1521**)
prime-pn-id	Prime Network ID number assigned by Prime Central

Example:

```
./DMIntegrator.sh -a ILIntegrator.prop 10.10.1.11 primedb primedba mypassword 1521 10
```

Step 7 On the remote DR node (S1), reload the user profile:

```
source $ANAHOME/.cshrc
```

Step 8 Log out from Prime Network application user and as root user change the following file name

```
cd /var/adm/cisco/prime-network/scripts/ha/rsync
mv rsync_exclude_pnil.txt.org rsync_exclude_pnil.txt
mv rsync_exclude_pnil_cfg.txt.org rsync_exclude_pnil_cfg.txt
```

Step 9 As the operating system root user, on the primary cluster node (P1), unfreeze the ana service.

```
clusvcadm -U ana
```

Next, disable the PN-IL health monitor as described in Disabling the PN-IL Health Monitor, page 4-27.

Disabling the PN-IL Health Monitor

When PN-IL is installed in a geographical redundancy deployment, the RHCS cluster service monitors PN-IL's status. Therefore, you should disable the PN-IL health monitor.

To disable the PN-IL health monitor, execute the following command as *pnuser*:

```
$ANAHOME/local/scripts/il-watch-dog.sh disable
```

Installing and Configuring PN-IL for Geographical Redundancy Only

This section explains how to install the Prime Network Integration Layer (PN-IL) 1.2 for a geographical redundancy only deployment. It also explains how to integrate the deployment with Cisco Prime Central. For information on the Prime Central releases with which you can integrate PN-IL 1.2, see the *Cisco Prime Network 5.1 Release Notes*.

Note PN-IL geographical redundancy only has a primary server (P1) at the local site and remote server (S1) at a remote geographical site for a full disaster recovery.

These topics provide the information you will need to install and configure PN-IL geographical only deployments:

- Installation DVD, page 4-20
- Steps for Installing PN-IL with Geographical Redundancy Only, page 4-28
- Installing PN-IL on a Prime Network Server (Geographical Redundancy Only), page 4-29
- Configuring PN-IL on a Prime Network Gateway (Geographical Redundancy Only), page 4-31
- Disabling the PN-IL Health Monitor, page 4-27

If you want to migrate an *existing* standalone installations of PN-IL (with geographical redundancy) to suite mode, you can use the procedure in Configuring and Migrating PN-IL with Prime Central (Suite Mode with Local + Geographical Redundancy), page 4-24.

Steps for Installing PN-IL with Geographical Redundancy Only

Table 4-7 provides the basic steps you must follow to set up geographical redundancy only for PN-IL. If you want to migrate an *existing* standalone installations of PN-IL (with geographical redundancy only) to suite mode, you can use the procedure in Configuring and Migrating PN-IL with Prime Central (Suite Mode with Local + Geographical Redundancy), page 4-24.

Note that you only have to install PN-IL on the primary server (P1), not on the remote (DR) server (S2). However, you will have to do some configuration tasks on the remote server.

Table 4-8 Steps for Setting Up PN-IL Geographical Redundancy

	Task	Topic/Action Required	Local Cluster		Remote (DR) Server
			Server (P1) (has Primary database)	Server (P2)	Remote Server (S1)
Step 1	Collect server details, so that you have all information handy prior to installation.	• IP address of P1 • IP Address of remote DR server S1 • Prime Network application root username and password for primary and remote DR servers (P1 and S1) • URL for authenticating Prime Network calls for P1 and S1 (normally **https://localhost:6081/ana/services/userman**) • ((Suite mode) For the Prime Central server where Oracle is installed: Hostname, database service name, database username and password, and database port.	x	—	x
Step 2	Verify the server meets the prerequisites.	Installation Requirements for Geographical Redundancy, page 4-4	x	—	—
Step 3	Configure PN-IL (in standalone or suite mode) on both nodes.	Configuring PN-IL on a Prime Network Gateway (Local + Geographical Redundancy), page 4-23	x	—	x
Step 4	Disable the PN-IL Health Monitor.	Disabling the PN-IL Health Monitor, page 4-27	x	—	x

Installing PN-IL on a Prime Network Server (Geographical Redundancy Only)

Use this procedure to install PN-IL with geographical redundancy on the primary server (P1). The primary node will copy the necessary files to the remote DR node (S1). For the remote DR node, you only have to perform some minor configurations.

Before You Begin:

Make sure Prime Network is installed and is up and running on the both the primary node (P1) and the remote DR node (S1). In the following procedure, $ANAHOME is the *pnuser* environment variable for the Prime Network installation directory (/export/home/*pnuser* by default).

Step 1 On the remote DR node (S1), log in as root and save your rsync settings so they are not overwritten during the PN-IL installation process.

```
ssh root@remote-DR-node-name
cd /var/adm/cisco/prime-network/scripts/ha/rsync
mv rsync_exclude_pnil.txt rsync_exclude_pnil.txt.org
mv rsync_exclude_pnil_cfg.txt rsync_exclude_pnil_cfg.txt.org
```

Step 2 On the primary node (P1), log in as *pnuser*.

```
su - pnuser
```

For example:

```
su - pn41
```

Step 3 On the primary node, create an installation directory for PN-IL.

```
mkdir -p $ANAHOME/new-pnil-dir
```

For example, if the Prime Network installation directory was /export/home/pn41, you would run this command to create an installation directory called pnil:

```
mkdir -p $ANAHOME/pnil
```

Step 4 On the primary cluster node (P1), copy the installation files from the installation DVD, extract them, and start the installation script. These examples use the PN-IL installation directory /pnil.

a. Copy the PN-IL installation tar file from Disk 2 to the directory you created in Step 4. In the following example, the installation directory is named **pnil**.

```
cp /tmp/sil-esb-1.2.0.tar.gz $ANAHOME/pnil
```

b. Change to the directory you created in Step 4 and extract the files from the PN-IL installation tar:

```
cd $ANAHOME/pnil
tar -zxf sil-esb-1.2.0.tar.gz
```

c. Change to directory where the installation tar files were extracted and run the installation script:

```
cd sil-esb-1.2.0/install/packages
./installAndConfigureEsb.sh
```

Step 5 On the primary node (P1), reload the user profile.

```
source $ANAHOME/.cshrc
```

Step 6 Log into the remote DR server (S1) as root and move the original rsync exclude file (that you moved in Step 1) back to its proper place.

```
ssh root@remote-DR-server
cd /var/adm/cisco/prime-network/scripts/ha/rsync
mv rsync_exclude_pnil.txt.org rsync_exclude_pnil.txt
mv rsync_exclude_pnil_cfg.txt.org rsync_exclude_pnil_cfg.txt
```

Step 7 Configure PN-IL as described in Configuring PN-IL on a Prime Network Gateway (Local + Geographical Redundancy), page 4-23.

Note Do not unfreeze the ana service until PN-IL has been configured.

Note You do not have to install the geographical redundancy files on the remote server (S1); the necessary files will be copied to the remote DR server by the primary node.

Configuring PN-IL on a Prime Network Gateway (Geographical Redundancy Only)

Configuration tasks must be performed on both the primary node (P1) and the remote DR node (S1).

- For standalone mode (that is, Prime Network is not integrated with Prime Central), follow the instructions in Configuring PN-IL with Prime Network (Standalone Mode with Local + Geographical Redundancy), page 4-23.
- For suite mode (Prime Network is integrated with Prime Central), follow the instructions in Configuring and Migrating PN-IL with Prime Central (Suite Mode with Local + Geographical Redundancy), page 4-24.

Configuring PN-IL with Prime Network (Standalone Mode with Geographical Redundancy Only)

In standalone mode, Prime Network is not integrated with Prime Central and can independently expose MTOSI and 3GPP web services to other OSS/applications. In the following procedure:

- $PRIMEHOME is the *pnuser* environment variable for the PN-IL installation directory you created in Installing PN-IL on a Prime Network Server (Local + Geographical Redundancy), page 4-21.
- $ANAHOME is the *pnuser* environment variable for the Prime Network installation directory (/export/home/*pnuser* by default).

Step 1 From the primary node (P1), log in as *pnuser*.

Step 2 On the primary node (P1), configure PN-IL in standalone mode.

```
itgctl config 1 --anaPtpServer ana-primary-ip --anaPtpUser pn-root-user --anaPtpPw
pn-root-user-password --authURL network-authentication-URL
```

itgctl uses these arguments.

Argument	Description
ana-primary-ip	• When run on the primary cluster node (P1), this is the IP address of the primary server. • When run on the remote DR node, this is the IP address of the remote DR server.
pn-root-user	Name of Prime Network root user (usually **root**)
pn-root-user-password	Password for Prime Network root user
network-authentication-URL	URL used to authenticate Prime Network calls (usually **https://localhost:6081/ana/services/userman**)

For example:

```
itgctl config 1 --anaPtpServer 192.0.2.22 --anaPtpUser root --anaPtpPw myrootpassword
--authURL https://192.0.2.22:6081/ana/services/userman
```

Step 3 On the primary node (P1), start PN-IL.

```
$PRIMEHOME/bin/itgctl start
```

Step 4 Open a new session on the remote DR server (S1) and log in as *pnuser*.

Step 5 On the remote DR server (S1), configure PN-IL in standalone mode but use the *remote DR server's IP address* (**--anaPtpServer** *remote-DR-ip*).

```
itgctl config 1 --anaPtpServer remote-DR-server-ip --anaPtpUser pn-root-user --anaPtpPw
pn-root-user-password --authURL network-authentication-URL
```

Step 6 On the primary cluster node (P1), start PN-IL.

```
$PRIMEHOME/bin/itgctl start
```

Step 7 Enable NBI:

```
cd $PRIMEHOME/install/scripts
./accessconfig.sh nbi enable
```

Next, perform the necessary configuration steps that are described in Configuring PN-IL on a Prime Network Gateway (Local + Geographical Redundancy), page 4-23.

Configuring and Migrating PN-IL with Prime Central (Suite Mode with Geographical Redundancy Only)

When Prime Network and PN-IL are running in *suite mode*, that means they are integrated with Prime Central. This procedure explains how to integrate PN-IL with a deployment of Prime Central that uses geographical redundancy only. You can use this procedure for:

- New installations of PN-IL with geographical redundancy.
- Existing standalone installations of PN-IL with geographical redundancy, that you want to move from standalone to suite mode.

In the following procedure, $PRIMEHOME is the *pnuser* environment variable for the PN-IL installation directory you created in Installing PN-IL on a Prime Network Server (Local + Geographical Redundancy), page 4-21.

Before You Begin

Before you begin, verify the following:

- PN-IL is already installed. If it is not, install it as described in Installing and Configuring PN-IL for Local + Geographical Redundancy, page 4-20.
- Prime Network is running suite mode. For information on integrating Prime Network with Prime Central, see *Cisco Prime Central Quick Start Guide, 2.0.*
- Prime Central is using both local geographical redundancy.

To integrate PN-IL with Prime Central:

Step 1 From the Prime Network primary node (P1), log in as *pnuser* and stop prime network integration layer.

```
su - pnuser
$PRIMEHOME/itgctl stop
```

Step 2 On the Prime Network primary node (P1), configure PN-IL in suite mode, edit the necessary integration files, and run the integration script:

a. Move to the PN-IL integration directory.

```
cd $PRIMEHOME/integration
```

b. Execute the following integration script to integrate PN-IL with Prime Central. Prime Central will assign an ID number to PN-IL. Note the ID number because you will need it later to integrate the remote DR server (S1) with Prime Central.

Note When you run DMIntegrator.sh, you must exactly follow the format below or the script will fail.

```
./DMIntegrator.sh -a ILIntegrator.prop prime-central-db-hostname
prime-central-db-service-name prime-central-db-user prime-central-db-user-password
prime-central-port-number
```

DMIntegrator uses these variables. You must enter them in this exact order.

DMIntegrator.sh Variable	Description
prime-central-server-hostname	Specifies the IP address of the Prime Central database server
prime-central-db-service-name	Specifies the name of Prime Central database service
prime-central db-user	Specifies the name of Prime Central database user (usually **primedba**)
prime-central-db-user-password	Specifies the password for Prime Central database user
prime-central-db-port	Specifies the port for Prime Central database (usually **1521**)

Example:

```
./DMIntegrator.sh -a ILIntegrator.prop 10.10.10.10 primedb primedba mypassword 1521
```

Step 3 On the Prime Network primary cluster node (P1), reload the user profile:

```
source $PRIMEHOME/.cshrc
```

Step 4 On the Prime Network primary node (P1), retrieve the ID that Prime Central assigned to Prime Network using **itgctl list.** You will need it in a future step.

```
$PRIMEHOME/bin/itgctl list
```

Step 5 Open a new session to the Prime Network remote DR server (S1) as a root user and rename file as shown below.

```
cd /var/adm/cisco/prime-network/scripts/ha/rsync
mv rsync_exclude_pnil.txt rsync_exclude_pnil.txt.org
mv rsync_exclude_pnil_cfg.txt rsync_exclude_pnil_cfg.txt.org
```

Step 6 On the Prime Network remote DR server (S1), configure PN-IL in suite mode as *pnuser*. Edit the necessary integration files, and run the integration script.

a. su - *pnuser*

b. Move to the PN-IL integration directory.

```
cd $PRIMEHOME/integration
```

c. Edit the **ILIntegrator.prop** file and change the value of the 'HOSTNAME' property to the Prime Network remote DR server (S1) hostname. For example:

```
HOSTNAME=remote-pn-DR-server
```

d. Execute the following integration script to integrate PN-IL into the deployment:

```
./DMIntegrator.sh -a ILIntegrator.prop prime-DR-db-server-hostname db-service-name
db-user db-user-password db-port pn-id
```

DMIntegrator uses these variables. You must enter them in this exact order.

DMIntegrator.sh Variable	Description
prime-DR-db-server-hostname	IP address of the Prime Central DR database server
db-service-name	Name of Prime Central database service
db-user	Name of Prime Central database user (usually **primedba**)
db-user-password	Password for Prime Central database user
db-port	Port for Prime Central database (usually **1521**)
prime-PNIL-DMID	Prime Network Integration Layer Domain ID number assigned by Prime Central

Example:

```
./DMIntegrator.sh -a ILIntegrator.prop 10.10.1.11 primedb primedba mypassword 1521 10
```

Step 7 On the remote DR node (S1), reload the user profile:

```
source $ANAHOME/.cshrc
```

Step 8 Log out from Prime Network application user and as root user change the following file name

```
cd /var/adm/cisco/prime-network/scripts/ha/rsync
mv rsync_exclude_pnil.txt.org rsync_exclude_pnil.txt
mv rsync_exclude_pnil_cfg.txt.org rsync_exclude_pnil_cfg.txt
```

Next, disable the PN-IL health monitor as described in Disabling the PN-IL Health Monitor, page 4-27.

Upgrading Prime Network in Geographical Redundancy without Network Down Time

You can upgrade Prime Network 5.1 in Geographical redundancy setup without network down time.

Caution This is a complex procedure and could be risky (data loss, network outage) if the steps are not done exactly the way they are documented. It is recommended only for those, who strictly does not want any network down time during Prime Network Upgrade in Geo Redundancy setup. Only those with sound knowledge on Prime Network HA Geographical Redundancy (installing, maintaining, switchover, failure, disaster recovery) are recommended to execute this procedure. Before you begin to execute this procedure, understand the purpose and requirement.

Prerequisites

In your setup, make sure to have the following setup:

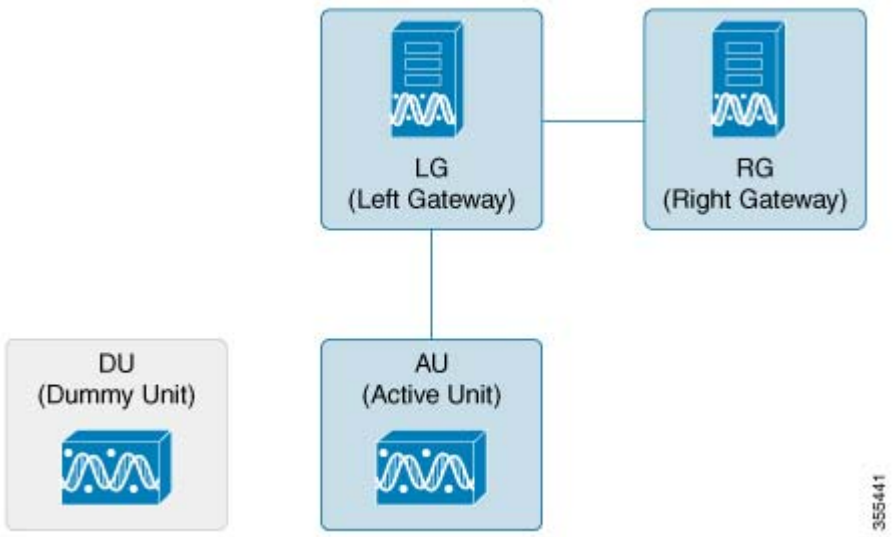
- At least one Active Unit (AU) attached to the Primary Node (LG).

- One DR Node (RG).
- In case of multiple units (AUs) attached to the Primary Node (LG), equal number of dummy units with data must be available.
- Fresh unit that is not connected to any gateway.
- With PN versions less than PN50, you should initially upgrade to PN50 following the below steps and then proceed upgrading to PN51 accordingly.

Upgrading Prime Network 5.0 to 5.1 with RHEL 7.4

You can Upgrade Prime Network 5.0 with RHEL 6.7 to Prime Network 5.1 with RHEL 7.4 version. This procedure is described using the following topology example, with only 1 Unit (AU) attached to Primary Node (LG) and having DR Node (RG). If you have multiple units attached to primary node, you should have equal no. of dummy Units and accordingly follow similar steps based on your setup.

Figure 4-2 Single Unit Setup with Left Gateway and Right Gateway



where,

- LG is the Primary Node
- RG is the DR Node
- AU is considered as Active Unit with data, which is connected to LG and DU is considered as a Fresh Unit, which is not connected to any gateway.

Procedure

Step 1 As the root user, Log in to the Prime Network primary cluster node (LG).

```
PRIME_HOME    -    /export/home/PN432
ORACLE_Home -   /ora/opt/ora1/oracle
```

If you use any Dummy Units with LG with no data, avm, vne's and so on, disconnect and delete them completely from LG.

Step 2 Block the route (connectivity) between AU and RG. (This is to avoid AU moving to RG when fail_over is run on RG).

For example, add the below route in RG

```
# route add  -host  <AU ip address>  reject
```

Step 3 Block the route (connectivity) between two gateways (LG and RG).

Step 4 Run Fail_over in RG.

```
perl primeha –fail" executed from /var/adm/cisco/prime-network/scripts/ha/util
```

Follow the steps to perform the post failover procedure in RG.:

1. Copy the "authorized_keys", "id_dsa", "id_dsa.pub" files from Oracle ana_secured (ORACLE_Home/ana_secured) to PN ana_secured (PRIME_HOME/local/ana_secured).

   Make sure to overwrite these files by providing "yes" when asked. For example:

   ```
   [root@pn-lnx ana_secured]# cp authorized_keys /export/home/pn432/local/ana_secured/
   cp: overwrite '/export/home/pn50/local/ana_secured/authorized_keys'? yes
   ```

2. Change the ownership of file to ana user and restart the SSH control.

   ```
   service sshd restart.
   ```

For PN versions below PN50 and in PN50, if there is a delay in the visibility of the Compliance Engine in RG post failover, follow the additional steps that are required to bring the compliance engine up.

a. Connect to RG : In "/export/home/PN<user>/Main/resources/compliance/product_profile.xml" file, make sure this line "<ConnectionURL>jdbc:oracle:thin:" has RG ip address.

b. Now, perform “networkctl restart” in RG. This should bring up the Compliance Engine.

Step 5 Verify if,

- both gateways acting as Active-Active with AU are still attached to the LG
- AU is moved to RG after Fail_over

Note Though AU is not moved to RG, it should still appear in RG after Fail_over with an unreachable state.

Step 6 Disconnect AU and Delete from the RG. (If you miss this step, RG looks for AU during upgrade and it might fail).

- It won’t allow to delete any units directly, first you need to disconnect Unit, delete all VNE’s, AVM’s and then delete the unit. For multiple units attached to LG, follow the same process.

The LG & AU monitors the n/w.

Step 7 Attach the DU to RG by running *network-conf*.

Note Make sure you select the same PN user name while installing, which the LG and RG have.

Step 8 Use **Export to CSV** to export all VNE’s of AU (attached to LG).

Step 9 Import them to DU (attached to RG). Provide valid device credentials and telnet sequence columns for all VNE’s accordingly in the Import CSV file. Now, DU will have a replica of AU.

Step 10 Compare and verify if both units have same set of data. For example, AVM’s, VNE’s including Tickets, Alarms, Map’s and so on. CCM jobs will be available in the Gateways.

Note In case, the Export/Import CSV option becomes very difficult in scale environment, contact an Advance services representative to get access to the tool. This tool helps you to handle importing large number of VNE's.

Step 11 **Take the back-up in RG before upgrade.**

```
Execute  "emdbctl -backup" from path - /PRIME_HOME/Main/scripts/embedded_db.
```

Back up files will be copied to /ORACLE_Home/backup/.

Step 12 Copy the *DR_disable_enable* script (available in the image/upgrade.zip folder of PN50) to PN home directory, and run as PN user in RG as shown below.

```
PN430@PN-HA% perl DR_disable_enable.pl -disable
successfully site updated DR value
Successfully updated /var/adm/cisco/prime-network/scripts/ha/ana_ha.conf dr_installed as
false
```

Prior to triggering Prime Network 5.1 upgrade in RG:

1. Log in as PN user in RG.
2. Delete the known_hosts file under ssh.
3. Connect SSH to self host, self ip, localhost one after other.This is to update the known_hosts entry with latest information.

Note After successful ssh to self host, you need to exit out and retry ssh to self ip. Follow the same for localhost. If you miss this step, upgrade the PN51 might fail.
Ensure to SSH all units connected to RG from PN user, so that RG will have a complete known_hosts updated list. This process will avoid units getting missed from upgrade to PN50 along with RG automatically

Step 13 Now, upgrade RG to PN50 using *upgrade.pl* script.

Note This upgrade takes care of DU upgrade as well.

While executing *Upgrade.pl*, select this option as YES, as shown below:

```
- High-Availability setup found
  Collecting High-Availability nodes credentials:
Is it ACTIVE-ACTIVE mode? (YES/NO) Default(NO):YES
  Please Provide the root user password for PN-HA-1-S [10.6.7.79]:
- Setting High Availability scripts permissions:
  Updating PN-HA-1-S                                                    [OK]
- Restarting databases
  Restarting embedded Oracle database
```

Step 14 After a successful upgrade to PN50 in RG, upgrade the oracle. For more information, see Upgrading the Oracle 12.1.0.2 to Embedded Database.

Upgrading the Oracle 12.1.0.2 to Embedded Database

After upgrading Prime Network 5.1 in RG, upgrade the oracle (embedded database) also to 122.

Before you begin

- Stop PN in RG. (networkctl stop).

To upgrade Oracle 12.1.0.2, complete the following procedure:

1. mkdir /tmp/upg12cunzip embedded_upgrade_12.1.zip to /tmp/upg12c (embedded_upgrade_12.1.zip should be taken from PN50)

   chmod a+x /tmp/upg12c/*.pl

2. Copy the two zip files to/tmp/upg12c:

   ```
   -linuxamd64_12c_database_1of2.zip
   -linuxamd64_12c_database_2of2.zip
   ```

3. Create the staging directory by entering the following commands:

   ```
   mkdir /export/home/stg
   cd /tmp/upg12c
   ```

4. Upgrade to Oracle 12.1.0.2 by entering the following command:

   ```
   # perl upgrade_embedded_oracle_12.pl
   ```

5. Verify if the oracle upgrade is successful using the following command:

   ```
   "opatch  lsinventory" as oracle user
   ```

6. After successful completion, start the Prime Network in RG.

Step 15 Start AVM's in DU under RG. Now, RG and DU will start monitoring the n/w.

Step 16 Stop AVM's in AU, as soon as the DU is ready to monitor the n/w.

Step 17 Upgrade RHEL in LG and AU.

After the RHEL upgrade, LG will be fresh without PN.

Follow the below steps to upgrade:

1. Install all the required RPM's for RHEL 7.2, stop, and disable firewall all (this is to avoid RMAN issue in later steps).
2. Like a fresh install, create partitions, mounts, /etc/hosts, copy PN50 oracle zip files accordingly.
3. Unzip RH_ha.zip of PN50 under /tmp in LG.
4. Enable the "DR_disable_enable" script (available in /export/home/pn50/local/scripts/) by executing as PN user in RG, as shown below:

   ```
   PN430@PN-HA% perl DR_disable_enable.pl -enable
   successfully site reverted DR value
   Successfully updated /var/adm/cisco/prime-network/scripts/ha/ana_ha.conf dr_installed
   as true
   ```

5. Unblock the route between Gateways.
6. As part of catastrophic recovery, (restore the redundancy configuration on the failed site after a catastrophic failure)

   ```
   execute perl resumeFromFailOver.pl -reinstall_setup from /tmp/RH_ha/  in LG.
   ```

   This will install PN50 and latest oracle122 in LG. Make sure you select the same name for PN user, which RG have.

7. Run "perl resumeFromFailOver.pl --setup_replication" from /tmp/RH_ha/ in RG. Wait for "Replication Success" event in RG.

Verifying Replication of Prime Network and Database

1. Verify the setup:
   a. LG – RHEL 7.2, PN50, oracle 12.1.0.2.
   b. RG – RHEL 6.7, PN50, oracle 12.1.0.2 (RHEL still needs to upgraded). Same is the status of DU.
   c. RG is current Active which is monitoring the n/w with DU and LG is current standby.

Upgrading RHEL in RG

To upgrade RHEL in RG:

Step 1 Block the route between DU and LG. (This is to avoid DU moving to LG when fail_over is run on LG, resulting in a minimal downtime.).

Step 2 Block the route between Gateways.

Step 3 Run this file as PN user /PRIME_HOME/.deploy/linux/fetch_ssh_daemon/deploy.cmd in LG.

Step 4 Run Fail_over (*perl primeha –fail*) in LG. Now we have Active-Active Gateways. RG & DU still monitoring the network.

Step 5 Though DU is still with RG monitoring the n/w, it would show up in LG post fail_over (in LG) with state as unreachable. Disconnect DU and delete the entries of DU completely in LG.

Step 6 Pick AU which is already upgraded to RHEL 7.2, install PN50 and attach it to LG by running *network-conf*. Make sure to select the same PN user name which, LG and RG have.

Step 7 Use **Export/Import CSV** to copy all the VNE's from DU to AU.

Step 8 Start AVM's in AU. Now monitoring of n/w should be taken care by LG and AU.

Step 9 Upgrade RHEL in RG.

   a. Re-install **all required RPM's**.

Note Make sure **firewall is stopped and disabled**.

   b. As like fresh install - create partitions, mounts, /etc/hosts
   c. Copy PN51 oracle zip files.
   d. Unzip RH_ha.zip of PN51 under /tmp.

Step 10 Unblock the route between Gateways, AU and RG.

Step 11 As part of catastrophic recovery, execute *perl resumeFromFailOver.pl -reinstall_setup* from /tmp/RH_ha/ in RG. This will install PN50 and latest oracle122 in RG. Make sure you select the same name for PN user which, LG have.

Step 12 Run *perl resumeFromFailOver.pl --setup_replication* from /tmp/RH_ha/ in LG.

Step 13 Wait for "Replication Success" event in LG. Verify that the replication of PN and Database is successful.

Step 14 View the similar final setup that is being illustrated in the beginning. For example, LG (active) – AU-: monitoring the network. RG will be standby g/w. Finally DU remain dummy, as before.