MSE軟體8.0版高可用性配置和部署指南

目錄

簡介

本檔案介紹適用於將Mobility Services Engine(MSE)高可用性(HA)新增以及將Context Aware Services和/或Adaptive Wireless Intrusion Prevention System(AwIPS)執行Cisco Unified Wireless LAN(WLAN)的使用者的設定和部署指南，以及疑難排解技巧。 本文檔旨在解釋MSE HA的准則並為MSE提供HA部署方案。

> **附註**：本文檔不提供與MSE HA不相關的MSE和相關元件的配置詳細資訊。其他檔案中提供了此資訊，並提供參考資料。自適應wIPS配置也不在本文檔中介紹。
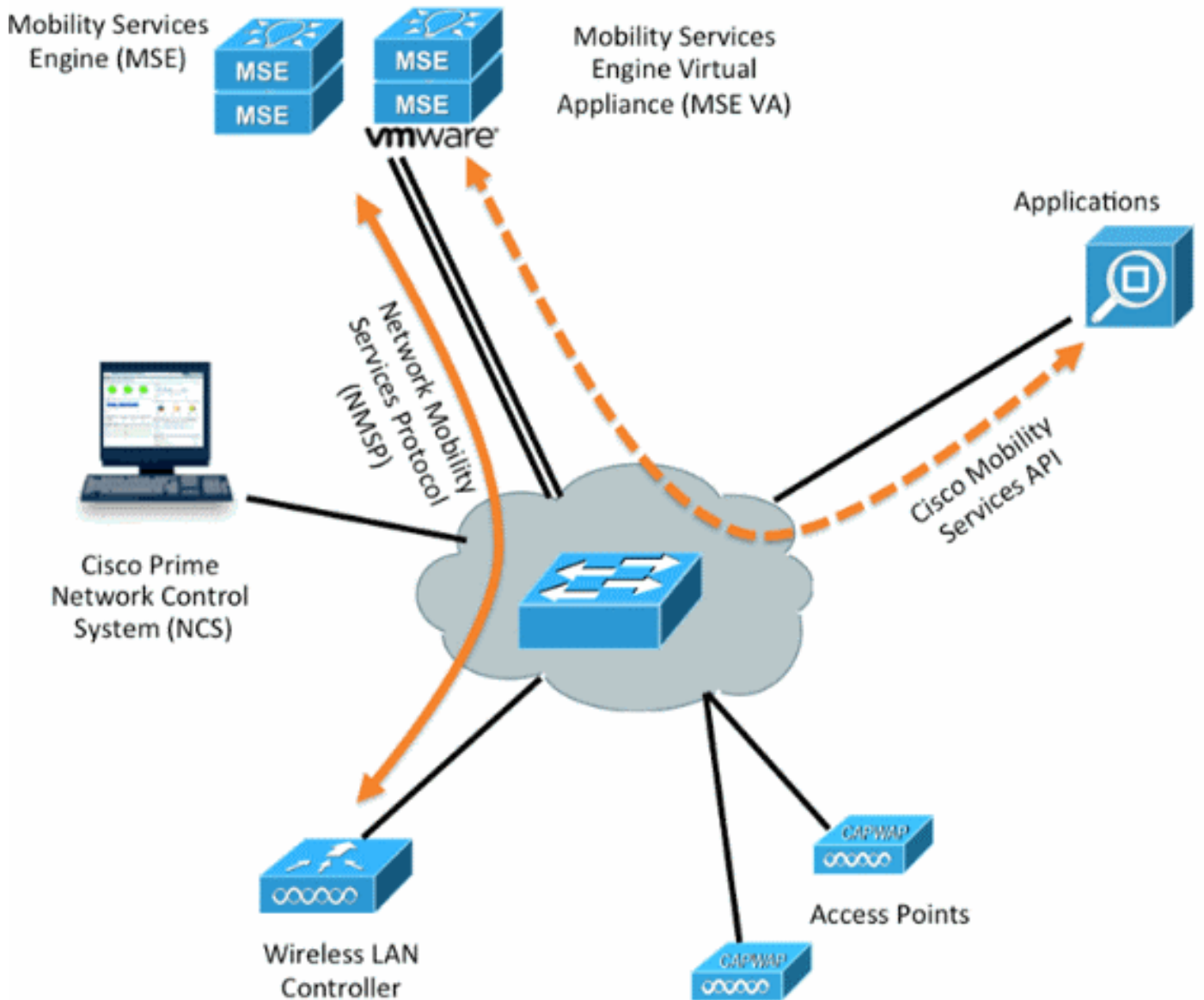
背景資訊

MSE是一個能夠運行多個相關服務的平台。這些服務提供高級服務功能。因此，考慮HA對於保持最高的服務信心至關重要。

啟用HA後，每個活動MSE都由另一個非活動例項備份。MSE HA引入了健康監控器，可在其中配置、管理和監控高可用性設定。維護主和輔助MSE之間的心跳。運行狀況監視器負責設定資料庫、檔案複製和監視應用程式。當主MSE發生故障且輔助節點接管時，主MSE的虛擬地址會透明地交換。

此設定（參見圖1.）演示了典型的Cisco WLAN部署，其中包括為HA啟用的Cisco MSE。

HA支援在MSE-3310、MSE-3350/3355、3365和ESXi上的虛擬裝置上提供。

圖1. HA中的MSE部署

准則和限制

以下資訊有關MSE HA架構：

- MSE虛擬裝置僅支援1:1 HA
- 一個輔助MSE最多可以支援兩個主要MSE。請參閱HA配對矩陣（圖2和3）
- HA支援網路連線和直接連線
- 僅支援MSE第2層冗餘。運行狀況監視器IP和虛擬IP必須位於同一子網上，並且不能從網路控制系統(NCS)第3層冗餘訪問
- 運行狀況監視器IP和虛擬IP必須不同
- 您可以使用手動或自動故障切換
- 您可以使用手動或自動故障恢復
- 主MSE和輔助MSE必須在相同的軟體版本上
- 每個活動的主MSE都由另一個非活動例項備份。只有在啟動故障切換過程後，輔助MSE才會變為活動狀態。
- 故障切換過程可以是手動或自動

- 每個註冊的主要MSE都有一個軟體和資料庫例項。

圖2. MSE HA支援配對矩陣

Primary Server Type	Secondary Server Type					
	3310	3350	3355	VA-Low	VA-Standard	VA-High
3310	Y	Y	Y	N	N	N
3350	N	Y	Y	N	N	N
3355	N	Y	Y	N	N	N
VA-Low	N	N	N	Y	Y	Y
VA-Standard	N	N	N	N	Y	Y
VA-High	N	N	N	N	N	Y

此矩陣的基準是，輔助例項必須始終與主例項具有相等或較高的規格，無論它們是裝置還是虛擬機器。

MSE-3365隻能與另一個MSE-3365配對。未測試/支援任何其他組合。

圖3. MSE HA N:1配對矩陣

Secondary Server	Primary Server
3310	N:1 not supported
3350	Two 3310 servers are supported
3355	Two 3310 servers are supported
3355	Two 3350 servers are supported
3355	One 3310 and one 3350 are supported

MSE虛擬裝置的HA配置方案（已連線網路）

此示例顯示MSE虛擬裝置(VA)的HA配置(請參見圖4)。 在此案例中，設定了以下設定：

- 主MSE VA:

```
Virtual IP — [10.10.10.11]

Health Monitor interface (Eth0) — [10.10.10.12]
```
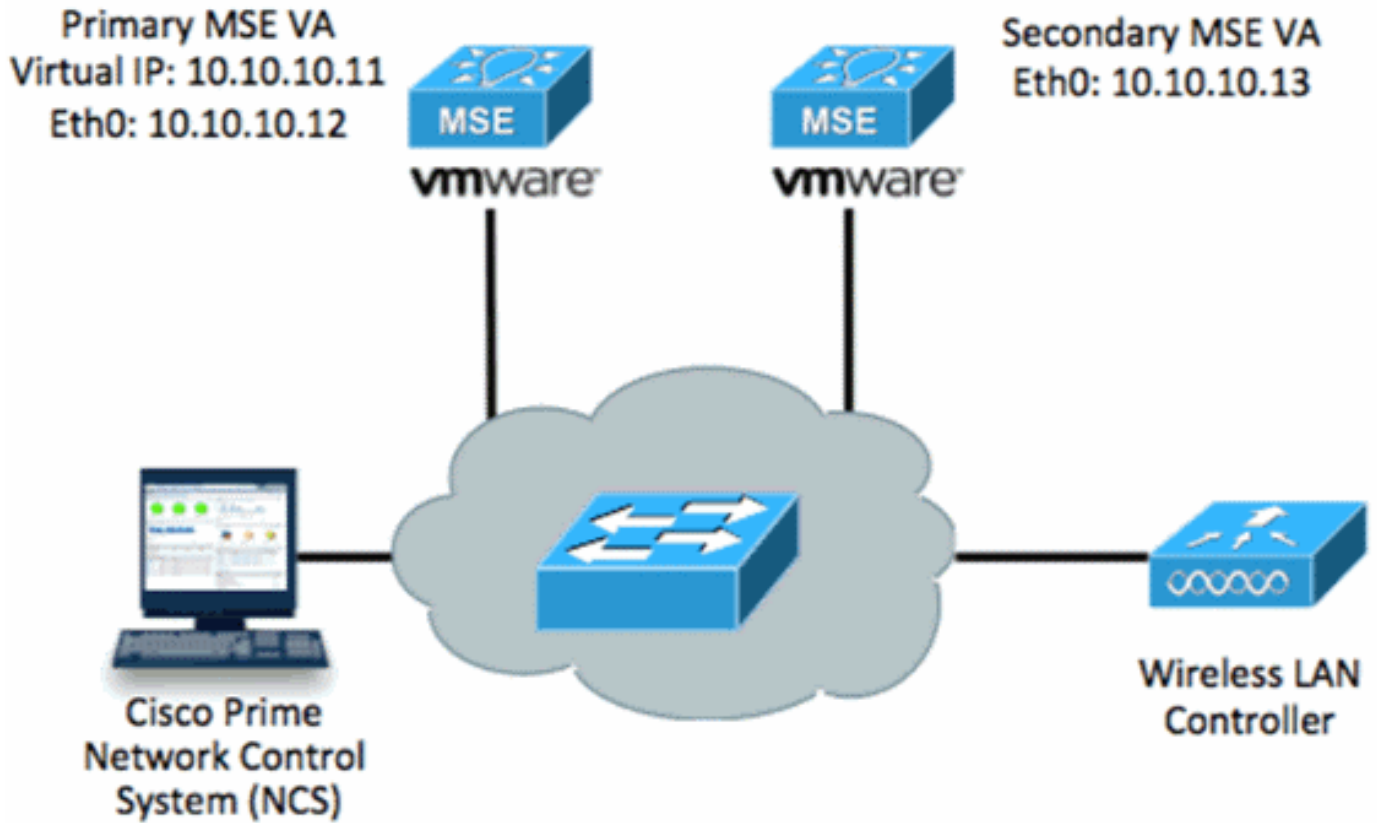- 輔助MSE VA:

```
Virtual IP — [None]
```

```
Health Monitor interface (Eth0) - [10.10.10.13]
```

附註：每個VA都需要一個啟用許可證(L-MSE-7.0-K9)。這是配置VA的HA所必需的。

圖4. HA中的MSE虛擬裝置

有關詳細資訊，請參閱<u>MSE虛擬裝置上的Cisco文檔</u>。

以下是一般步驟：

1. 完成MSE的VA安裝並驗證是否滿足所有網路設定，如下圖所示。

2. 首次登入時通過安裝嚮導設定引數，如下圖所示。

3. 輸入所需的條目（主機名、域等）。 在配置高可用性的步驟中輸入YES。

4. 輸入此資訊並如下圖所示。選擇Role - [1 for Primary]。運行狀況監視器介面 — [eth0][**]對映到
網路介面卡1的網路設定

5. 選擇直接連線介面[none] ，如下圖所示。

```
Health monitor interface holds physical IP address of this MSE server.
This IP address is used by Secondary, Primary MSE servers and WCS to communicate
 among themselves

Select Health Monitor Interface [eth0/eth1] [eth0]:

--------------------------------------------------------------------

Direct connect configuration facilitates use of a direct cable connection betwee
n the primary and secondary MSE servers.
This can help reduce latencies in heartbeat response times, data replication and
 failure detection times.
Please choose a network interface that you wish to use for direct connect. You s
hould appropriately configure the respective interfaces.
\"none\" implies you do not wish to use direct connect configuration.

--------------------------------------------------------------------

Select direct connect interface [eth0/eth1/none] [none]: _
```

6. 輸入以下資訊，如下圖所示：虛擬IP地址 — [10.10.10.11]網路掩碼 — [255.255.255.0]在恢復模式下啟動MSE - [否
   ]

```
Select direct connect interface [eth0/eth1/none] [none]:

Enter a Virtual IP address for first this primary MSE server

Enter Virtual IP address [1.1.1.1]: 10.10.10.11

Enter the network mask for IP address 10.10.10.11.

Enter network mask [1.1.1.1]: 255.255.255.0

Choose to start the server in recovery mode.
You should choose yes only if this primary was paired earlier and you have now l
ost the configuration from this box.
And, now you want to restore the configuration from Secondary via NCS
Do you wish to start this MSE in HA recovery mode ?: (yes/no): no_
```

7. 輸入以下資訊，如下圖所示：配置Eth0 - [是]輸入Eth0 IP地址 — [10.10.10.12]網路掩碼 — [255.255.255.0]預設網關 —
   [10.10.10.1]

```
Current IP address=[1.1.1.10]
Current eth0 netmask=[255.255.255.0]
Current gateway address=[1.1.1.1]
Configure eth0 interface parameters? (Y)es/(S)kip/(U)se default [Yes]

Enter an IP address for first ethernet interface of this machine.

Enter eth0 IP address [1.1.1.10]: 10.10.10.12

Enter the network mask for IP address 10.10.10.12.

Enter network mask [255.255.255.0]:

Enter an default gateway address for this machine.

Note that the default gateway must be reachable from
the first ethernet interface.

Enter default gateway address [1.1.1.1]: 10.10.10.1_
```

8. 第二個乙太網介面(Eth1)未使用。設定eth1介面 — [skip]，如下圖所示。

```
The second ethernet interface is currently disabled for this machine.
Configure eth1 interface parameters? (Y)es/(S)kip/(U)se default [Yes]: s
```

9. 如圖所示繼續完成安裝嚮導。啟用NTP伺服器以同步時鐘至關重要。首選時區為UTC。

```
Domain Name Service (DNS) Setup
DNS is currently enabled.
No DNS servers currently defined
Configure DNS related parameters? (Y)es/(S)kip/(U)se default [Yes]: s

Current timezone=[America/New_York]
Configure timezone? (Y)es/(S)kip/(U)se default [Yes]:

Enter the current date and time.

Please identify a location so that time zone rules can be set correctly.
Please select a continent or ocean.
 1) Africa
 2) Americas
 3) Antarctica
 4) Arctic Ocean
 5) Asia
 6) Atlantic Ocean
 7) Australia
 8) Europe
 9) Indian Ocean
10) Pacific Ocean
11) UTC - I want to use Coordinated Universal Time.
12) Return to previous setup step (^).
#? 11
```

```
Network Time Protocol (NTP) Setup.

If you choose to enable NTP, the system time will be
configured from NTP servers that you select.  Otherwise,
you will be prompted to enter the current date and time.

NTP is currently disabled.
Configure NTP related parameters? (Y)es/(S)kip/(U)se default [Yes]:

Enter whether or not you would like to set up the
Network Time Protocol (NTP) for this machine.

If you choose to enable NTP, the system time will be
configured from NTP servers that you select.  Otherwise,
you will be prompted to enter the current date and time.

Enable NTP (yes/no) [no]: yes
Enter NTP server name or address: ntp.network.local
```

下面彙總了MSE VA主要設定：

```
-------BEGIN--------
Role=1, Health Monitor Interface=eth0, Direct connect interface=none
Virtual IP Address=10.10.10.11, Virtual IP Netmask=255.255.255.0
Eth0 IP address=10.10.10.12, Eth0 network mask=255.0.0.0
Default Gateway=10.10.10.1
-------END--------
```

10. 輸入yes以確認所有設定資訊均正確，如下圖所示。

```
Please verify the following setup information.

-------BEGIN--------

    Host name=mse1
            Role=1, Health Monitor Interface=eth0, Direct connect interface=none
            Virtual IP Address=10.10.10.11, Virtual IP Netmask=255.255.255.0
    Eth0 IP address=10.10.10.12, Eth0 network mask=255.255.255.0
    Default gateway=10.10.10.1
    Time zone=UTC
    Enable NTP=yes, NTP servers=10.10.10.10

-------END--------

You may enter "yes" to proceed with configuration, "no" to make
more changes, or "^" to go back to the previous step.

Configuration Changed
Is the above information correct (yes, no, or ^): yes_
```

11. 建議安裝後重新引導，如下圖所示。

```
[root@mse1 ~]# reboot
Stopping MSE Platform
```

12. 重新開機後，使用/etc/init.d/msed start或service msed start命令啟動MSE服務，如下圖所示。

```
[root@mse1 ~]# getserverinfo
Health Monitor is not running
[root@mse1 ~]# /etc/init.d/msed start
Starting MSE Platform

ip_tables: (C) 2000-2006 Netfilter Core Team
Netfilter messages via NETLINK v0.30.
ip_conntrack version 2.4 (8192 buckets, 65536 max) - 304 bytes per conntrack
Starting Health Monitor, Waiting to check the status.
Starting Health Monitor, Waiting to check the status.
Health Monitor successfully started
Starting Admin process...
Started Admin process.
Starting database ......
Database started successfully. Starting framework and services ..............
Framework and services successfully started


[root@mse1 ~]#
```

13. 所有服務啟動後，使用getserverinfo命令確認MSE服務是否正常工作。操作狀態必須顯示為「Up」，如下圖所示。

```
Active Wired Clients: 0
Active Elements(Wireless Clients, Rogue APs, Rogue Clients, Interferers, Wired C
lients, Tags) Limit: 100
Active Sessions: 0
Wireless Clients Not Tracked due to the limiting: 0
Tags Not Tracked due to the limiting: 0
Rogue APs Not Tracked due to the limiting: 0
Rogue Clients Not Tracked due to the limiting: 0
Interferers Not Tracked due to the limiting: 0
Wired Clients Not Tracked due to the limiting: 0
Total Elements(Wireless Clients, Rogue APs, Rogue Clients, Interferers, Wired Cl
ients) Not Tracked due to the limiting: 0


-------------------------
Context Aware Sub Services
-------------------------


Subservice Name: Aeroscout Tag Engine
Admin Status: Disabled
Operation Status: Down

Subservice Name: Cisco Tag Engine
Admin Status: Enabled
Operation Status: Up
[root@mse1 ~]#
```

設定輔助MSE

這些步驟是輔助MSE VA設定的一部分：

1. 新安裝後，初始登入將啟動安裝嚮導。輸入以下資訊，如下圖所示：配置高可用性- [是]選擇角色- [2]，表示輔助運行狀況監控器介面 — [eth0]與主介面相同

```
Current hostname=[mse]
Configure hostname?   (Y)es/(S)kip/(U)se default [Yes]: yes

The host name should be a unique name that can identify
the device on the network. The hostname should start with
a letter, end with a letter or number, and contain only
letters, numbers, and dashes.

Enter a host name [mse]: mse2

Current domain=[]
Configure domain name? (Y)es/(S)kip/(U)se default [Yes]: s

Current role=[Primary]
Configure High Availability?   (Y)es/(S)kip/(U)se default [Yes]:

High availability role for this MSE (Primary/Secondary)

Select role [1 for Primary, 2 for Secondary] [1]: 2

Health monitor interface holds physical IP address of this MSE server.
This IP address is used by Secondary, Primary MSE servers and WCS to communicate
 among themselves

Select Health Monitor Interface [eth0/eth1] [eth0]:
```

2. 輸入如下圖所示的資訊：直接連線- [無]IP地址eth0 - [10.10.10.13]網路掩碼-
   [255.255.255.0]預設網關-
   [10.10.10.1]

```
----------------------------------------------------------------
Select direct connect interface [eth0/eth1/none] [none]:

Current IP address=[1.1.1.10]
Current eth0 netmask=[255.255.255.0]
Current gateway address=[1.1.1.1]
Configure eth0 interface parameters? (Y)es/(S)kip/(U)se default [Yes]:

Enter an IP address for first ethernet interface of this machine.

Enter eth0 IP address [1.1.1.10]: 10.10.10.13

Enter the network mask for IP address 10.10.10.13.

Enter network mask [255.255.255.0]:

Enter an default gateway address for this machine.

Note that the default gateway must be reachable from
the first ethernet interface.

Enter default gateway address [1.1.1.1]: 10.10.10.1_
```

3. 設定eth1介面 — **[Skip]**，如下圖所示。

```
Configure eth0 interface parameters? (Y)es/(S)kip/(U)se default [Yes]:

Enter an IP address for first ethernet interface of this machine.

Enter eth0 IP address [1.1.1.10]: 10.10.10.13

Enter the network mask for IP address 10.10.10.13.

Enter network mask [255.255.255.0]:

Enter an default gateway address for this machine.

Note that the default gateway must be reachable from
the first ethernet interface.

Enter default gateway address [1.1.1.1]: 10.10.10.1

The second ethernet interface is currently disabled for this machine.
Configure eth1 interface parameters? (Y)es/(S)kip/(U)se default [Yes]: s
```

4. 如圖所示設定**時區** — [UTC]。

```
Current timezone=[America/New_York]
Configure timezone? (Y)es/(S)kip/(U)se default [Yes]:

Enter the current date and time.

Please identify a location so that time zone rules can be set correctly.
Please select a continent or ocean.
 1) Africa
 2) Americas
 3) Antarctica
 4) Arctic Ocean
 5) Asia
 6) Atlantic Ocean
 7) Australia
 8) Europe
 9) Indian Ocean
10) Pacific Ocean
11) UTC - I want to use Coordinated Universal Time.
12) Return to previous setup step (^).
#? 11_
```

5. 如圖所示啟用NTP伺服器。

```
Network Time Protocol (NTP) Setup.

If you choose to enable NTP, the system time will be
configured from NTP servers that you select.  Otherwise,
you will be prompted to enter the current date and time.

NTP is currently disabled.
Configure NTP related parameters? (Y)es/(S)kip/(U)se default [Yes]:

Enter whether or not you would like to set up the
Network Time Protocol (NTP) for this machine.

If you choose to enable NTP, the system time will be
configured from NTP servers that you select.  Otherwise,
you will be prompted to enter the current date and time.

Enable NTP (yes/no) [no]: yes
Enter NTP server name or address: ntp.network.local_
```

6. 完成安裝嚮導的其餘步驟並確認安裝資訊，以儲存配置，如下圖所示。

```
Please verify the following setup information.

-------BEGIN---------

    Host name=mse2
          Role=2, Health Monitor Interface=eth0, Direct connect interface=none

    Eth0 IP address=10.10.10.13, Eth0 network mask=255.255.255.0
    Default gateway=10.10.10.1
    Time zone=UTC
    Enable NTP=yes, NTP servers=10.10.10.10

-------END---------

You may enter "yes" to proceed with configuration, "no" to make
more changes, or "^" to go back to the previous step.

Configuration Changed
Is the above information correct (yes, no, or ^): yes_
```

7. 重新啟動並啟動服務，與之前對主MSE執行的步驟相同，如下圖所示。

```
[root@mse2 ~]# /etc/init.d/msed start
Starting MSE Platform

ip_tables: (C) 2000-2006 Netfilter Core Team
Netfilter messages via NETLINK v0.30.
ip_conntrack version 2.4 (8192 buckets, 65536 max) - 304 bytes per conntrack
Starting Health Monitor, Waiting to check the status.
Starting Health Monitor, Waiting to check the status.
Health Monitor successfully started
Starting Admin process...
Started Admin process.
Starting database ......
Database started successfully. Starting framework and services .............
Framework and services successfully started

[root@mse2 ~]#
```
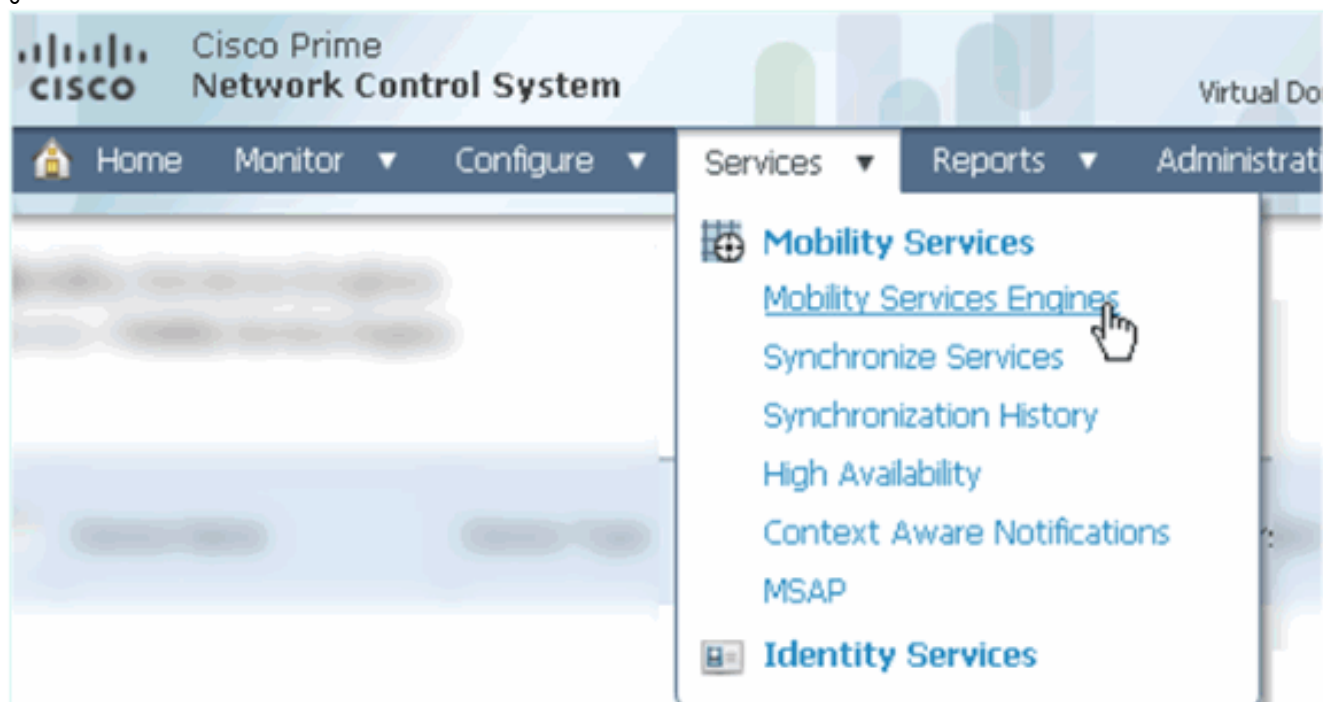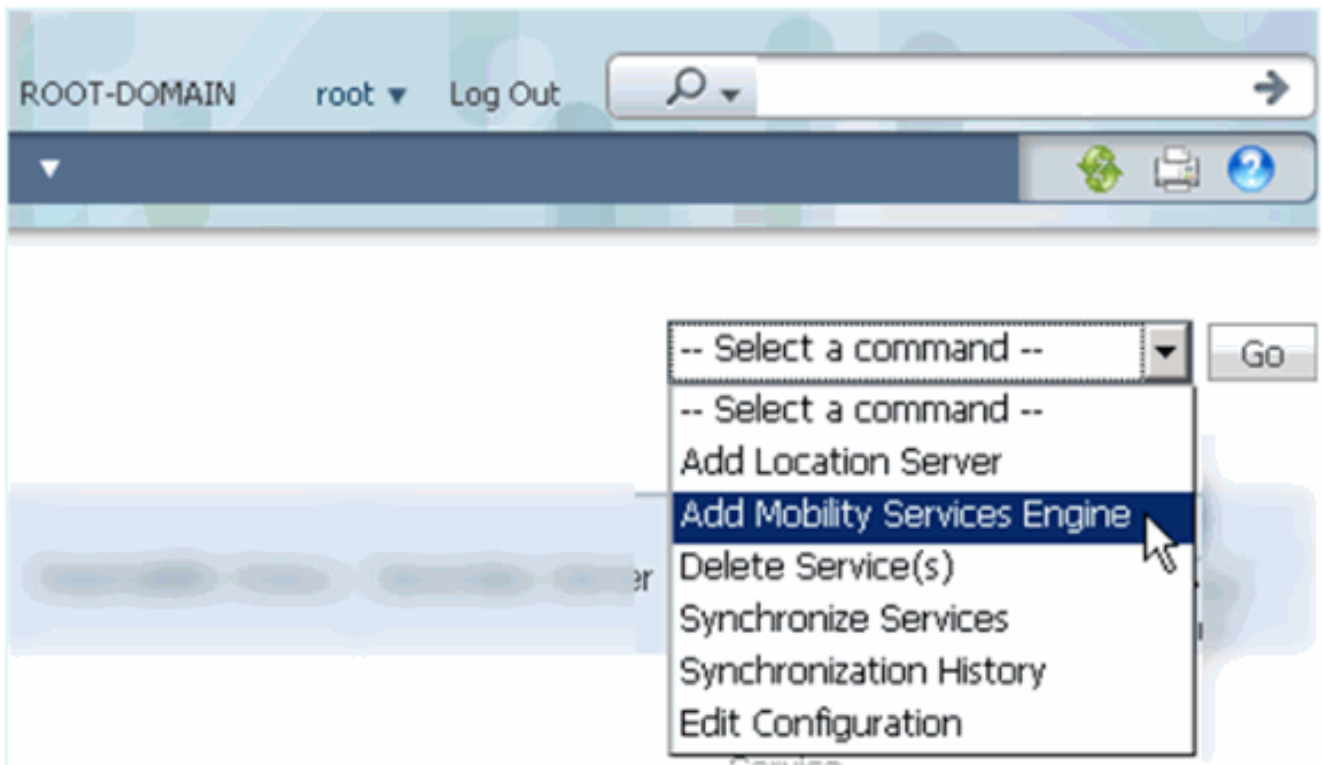
從Cisco Prime NCS（或Prime Infrastructure）管理它們

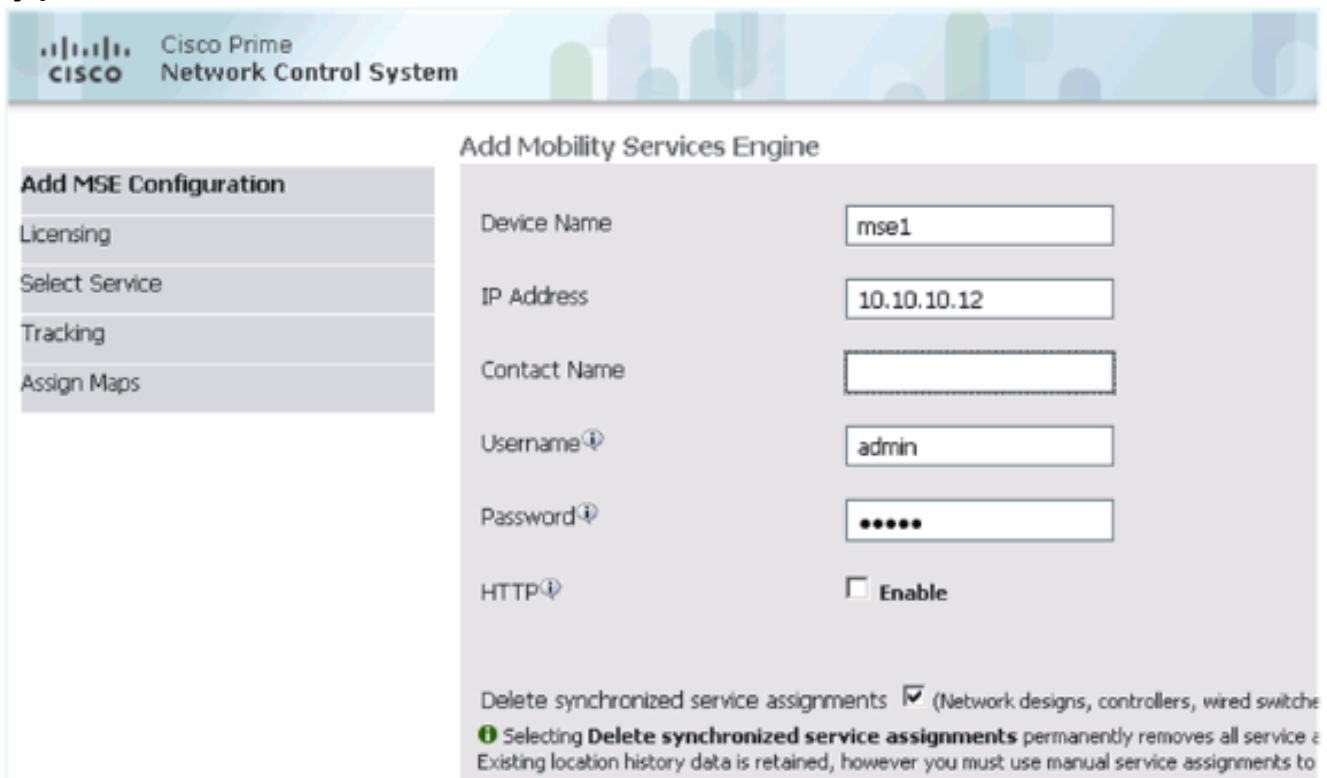接下來的步驟顯示如何將主和輔助MSE VA新增到NCS。執行將MSE新增到NCS的正常過程。如需幫助，請參閱配置指南。

1. 從NCS導航到**Systems > Mobility Services**，然後選擇**Mobility Services Engine**，如下圖所示。

2. 從下拉選單中選擇**Add Mobility Services Engine**。然後，按一下「**Go**」，如下圖所示。

3. 按照MSE的NCS配置嚮導操作。在本檔案的案例中，這些值為：輸入裝置名稱 — 例如 [MSE1]IP地址- [10.10.10.12]使用者名稱和密碼（每個初始設定）按一下「Next」，如下圖所示。

4. 新增所有可用許可證，然後按一下**下一步**，如下圖所示。

MSE License Summary

 Permanent licenses include installed license counts and in-built license counts.

MSE Name (UDI)	Service	Platform Limit	Type	Installed Limit
mse1 Activated (AIR-MSE-VA-K9:V01:mse1_d5972642-5696-11e1-bd0				
	CAS	2000	CAS Elements	100
	wIPS	2000	wIPS Monitor Mode APs	10
			wIPS Local Mode APs	10
	MSAP	2000	Service Advertisement Clicks	1000

Add License   Remove License

5. 選擇MSE services，然後按一下Next（如下圖所示）。
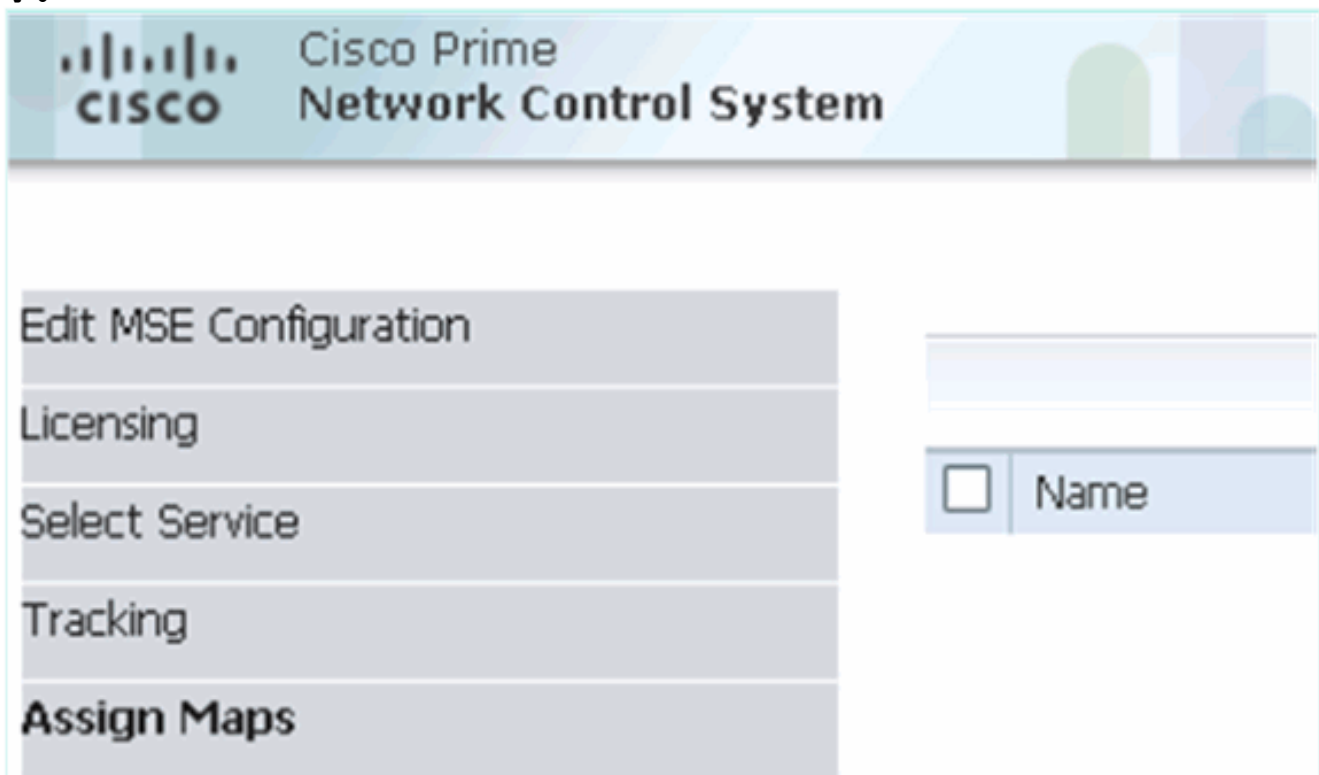

Select Mobility Service

☑ Context Aware Service

    ◉ Cisco Context-Aware Engine for Clients and Tags

    ○ Partner Tag Engine ⓘ

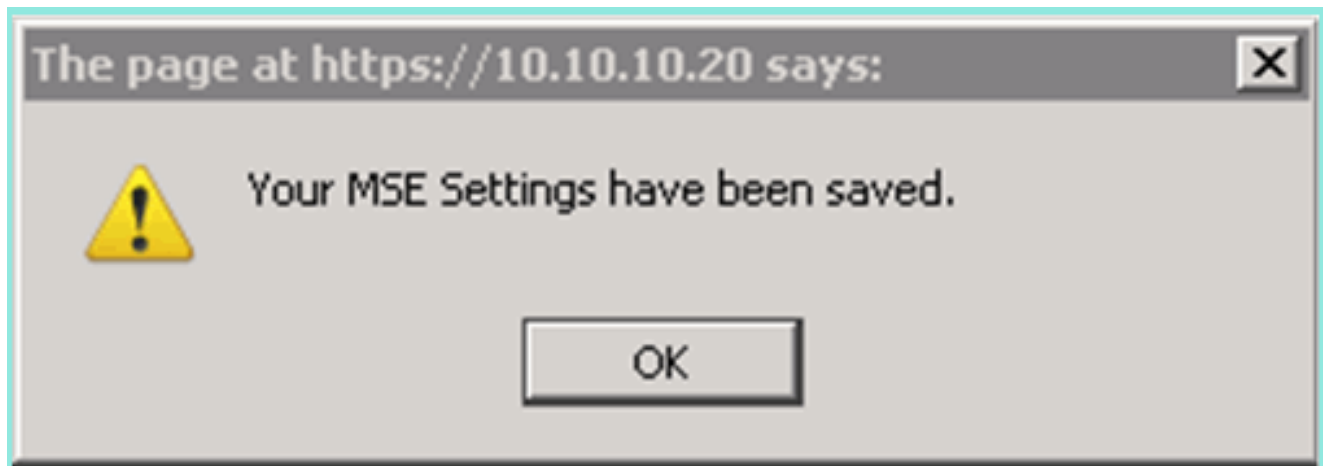☐ Wireless Intrusion Protection Service

☐ MSAP Service

6. 啟用跟蹤引數，然後按一下下一步，如下圖所示。

Select Tracking & History Parameters.

Tracking
- ☑ Wired Clients
- ☑ Wireless Clients
- ☐ Rogue AccessPoints
  - ☐ Exclude Adhoc Rogue APs
- ☐ Rogue Clients
- ☐ Interferers
- ☑ Active RFID Tags

7. 分配對映和同步MSE服務是可選的。按一下**完成**以完成將MSE新增到NCS的過程，如下圖所示。

☐	Name

The page at https://10.10.10.20 says:

⚠ Your MSE Settings have been saved.

OK

將輔助MSE新增到Cisco Prime NCS

下一個螢幕截圖顯示已新增主MSE VA。現在，完成以下步驟以新增輔助MSE VA:

1. 找到「Secondary Server」列，然後按一下要配置的連結，如下圖所示。

2. 在此方案中，使用配置新增輔助MSE VA:輔助裝置名稱- [mse2]輔助IP地址-
   [10.10.10.13]Secondary Password* - [預設或來自安裝指令碼]故障切換型別* - [自動或手動]回
   退型別*長故障切換等待*按一下「**Save**」。*按一下資訊圖示或參閱MSE文檔（如果需要）。

HA Configuration : mse1
Services > Mobility Services Engines > System > Services High Availability > **Configure High Availability Parameters**

Configure High Availability Parameters

Primary Health Monitor IP	10.10.10.12
Secondary Device Name	mse2
Secondary IP Address	10.10.10.13
Secondary Password ⓘ	•••••
Failover Type ⓘ	Automatic
Failback Type ⓘ	Manual
Long Failover Wait ⓘ	10 seconds

Save

3. 當NCS提示配對兩個MSE時，按一下**OK**，如下圖所示。
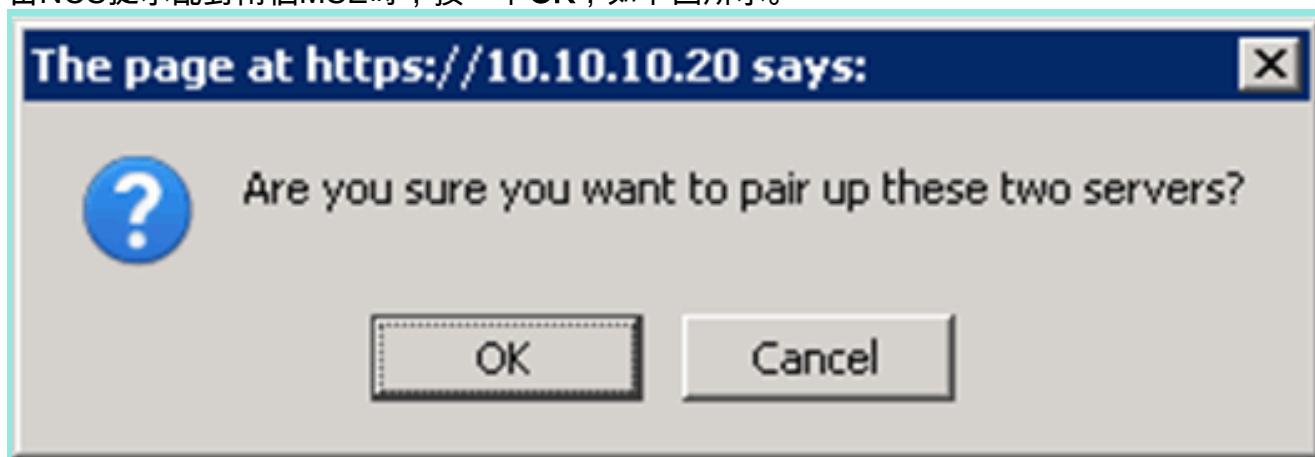
NCS建立配置需要幾秒時間，如下圖所示。
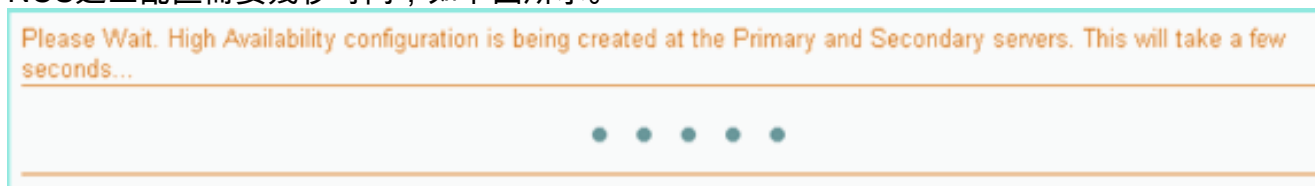
NCS提示輔助MSE VA是否需要啟用許可證(L-MSE-7.0-K9)，如下圖所示。

4. 按一下「**OK**」，找到「License File」以啟用「Secondary」，如下圖所示。

HA Configuration : mse1
Services > Mobility Services Engines > System > Services High Availability > **Configure High Availability Parameters**
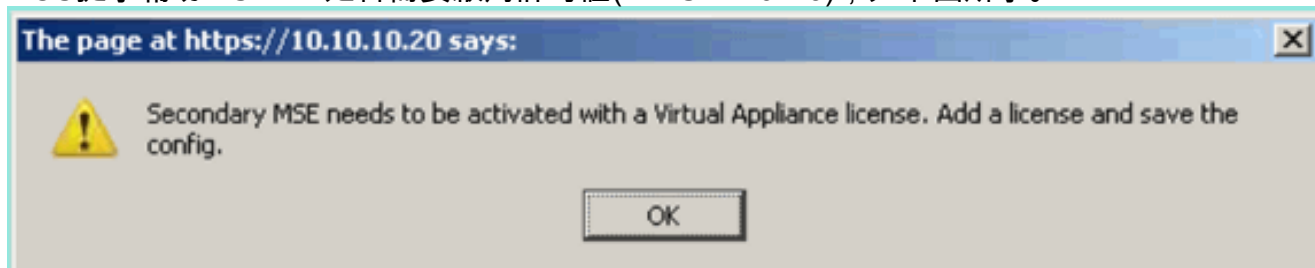
Configuration

Primary Health Monitor IP	10.10.10.12
Secondary Device Name	mse2
Secondary IP Address	10.10.10.13
Secondary Password ⓘ	•••••
Secondary Platform UDI	AIR-MSE-VA-K9:V01:mse2_666f2046-5699-11e1-b1b1-005056€
Secondary Activation Status	Not Activated
Activate Secondary with License	[ ] Browse...
Failover Type ⓘ	Automatic ▾
Failback Type ⓘ	Manual ▾
Long Failover Wait ⓘ	10 seconds

Save   Delete

5. 啟用輔助MSE VA後，按一下**Save**以完成配置，如下圖所示。

HA Configuration : mse1
Services > Mobility Services Engines > System > Services High Availability > **Configure High Availability Parameters**

Configuration

Primary Health Monitor IP	10.10.10.12
Secondary Device Name	mse2
Secondary IP Address	10.10.10.13
Secondary Password ⓘ	•••••
Secondary Platform UDI	AIR-MSE-VA-K9:V01:mse2_666f2046-5699-11e1-b1b1-005
Secondary Activation Status	Activated
Delete Secondary Activation license ⓘ	☐
Failover Type ⓘ	Automatic ▾
Failback Type ⓘ	Manual ▾
Long Failover Wait ⓘ	10 seconds

Save   Delete   Switchover

6. 導航到**NCS > Mobility Services > Mobility Services Engine**。NCS顯示此螢幕，其中輔助

MSE出現在輔助伺服器的列中
：

7. 若要檢視HA狀態，請導覽至NCS > Services > High Availability，如下圖所示。
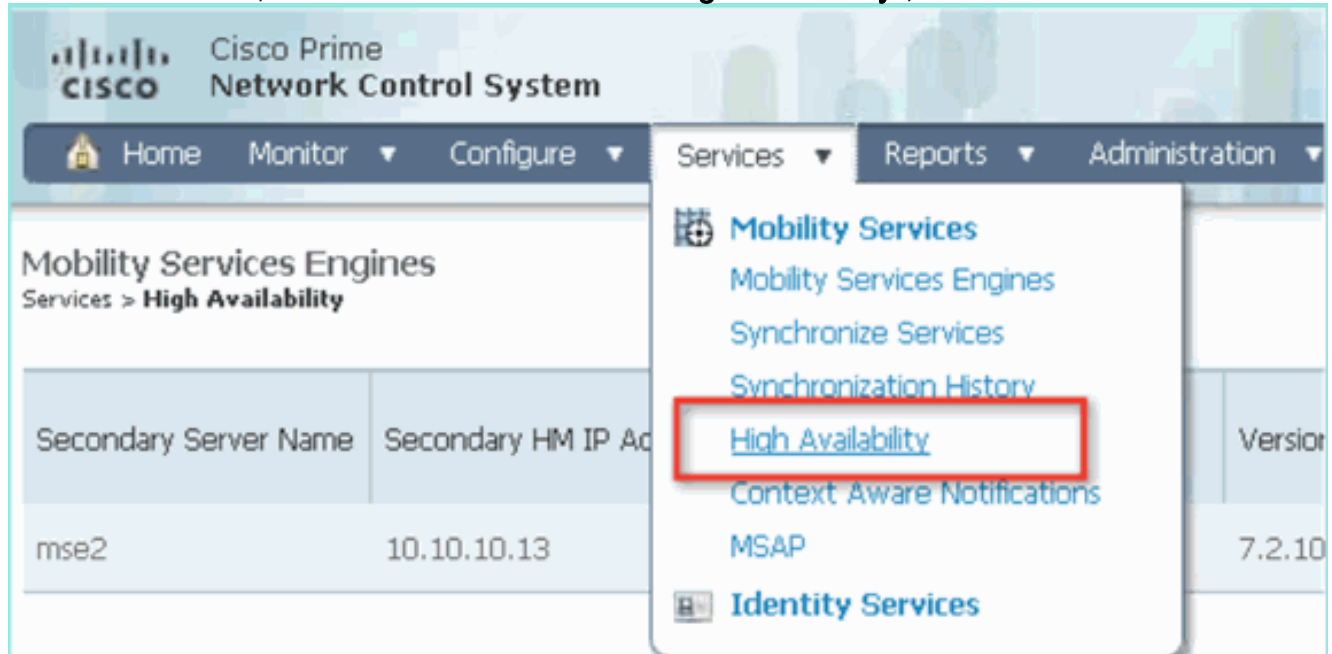
在HA狀態中，您可以通過MSE對檢視目前的狀態和事件，如下圖所示。

設定初始同步和資料複製可能需要幾分鐘時間。NCS會提供進度％指示，直到HA對完全處於活動狀態(如上所示)為止。

Current High Availability Status

Status	Primary and secondary server synchronization in progress (68% complete)
Heartbeats	Up
Data Replication	Setting up
Mean Heartbeat Response Time	108 millisec

與HA相關的MSE軟體版本7.2中引入的新命令是**gethainfo**。此輸出顯示Primary和Secondary:

```
[root@mse1 ~]#gethainfo

Health Monitor is running. Retrieving HA related information

-------------------------------------------------------
Base high availability configuration for this server
-------------------------------------------------------

Server role: Primary
Health Monitor IP Address: 10.10.10.12
Virtual IP Address: 10.10.10.11
Version: 7.2.103.0
UDI: AIR-MSE-VA-K9:V01:mse1
Number of paired peers: 1

----------------------------
Peer configuration#: 1
----------------------------

Health Monitor IP Address 10.10.10.13
Virtual IP Address: 10.10.10.11
Version: 7.2.103.0
UDI: AIR-MSE-VA-K9:V01:mse2_666f2046-5699-11e1-b1b1-0050568901d9
Failover type: Manual
Failback type: Manual
Failover wait time (seconds): 10
Instance database name: mseos3s
Instance database port: 1624
Dataguard configuration name: dg_mse3
Primary database alias: mseop3s
Direct connect used: No
Heartbeat status: Up
Current state: PRIMARY_ACTIVE


[root@mse2 ~]#gethainfo

Health Monitor is running. Retrieving HA related information

-------------------------------------------------------
Base high availability configuration for this server
-------------------------------------------------------

Server role: Secondary
Health Monitor IP Address: 10.10.10.13
Virtual IP Address: Not Applicable for a secondary
Version: 7.2.103.0
UDI: AIR-MSE-VA-K9:V01:mse2
Number of paired peers: 1
```

```
----------------------------
Peer configuration#: 1
----------------------------

Health Monitor IP Address 10.10.10.12
Virtual IP Address: 10.10.10.11
Version: 7.2.103.0
UDI: AIR-MSE-VA-K9:V01:mse1_d5972642-5696-11e1-bd0c-0050568901d6
Failover type: Manual
Failback type: Manual
Failover wait time (seconds): 10
Instance database name: mseos3
Instance database port: 1524
Dataguard configuration name: dg_mse3
Primary database alias: mseop3s
Direct connect used: No
Heartbeat status: Up
Current state: SECONDARY_ACTIVE
```

使用直接連線的HA配置

網路連線的MSE HA會使用網路,而直接連線組態會促進使用主要MSE伺服器和輔助MSE伺服器之間的直接纜線連線。這有助於減少心跳響應時間、資料複製和故障檢測時間方面的延遲。在此場景中,主物理MSE連線到介面eth1上的輔助MSE(如圖5所示)。請注意,Eth1用於直接連線。每個介面需要一個IP地址。

圖5:含直接連線的MSE HA
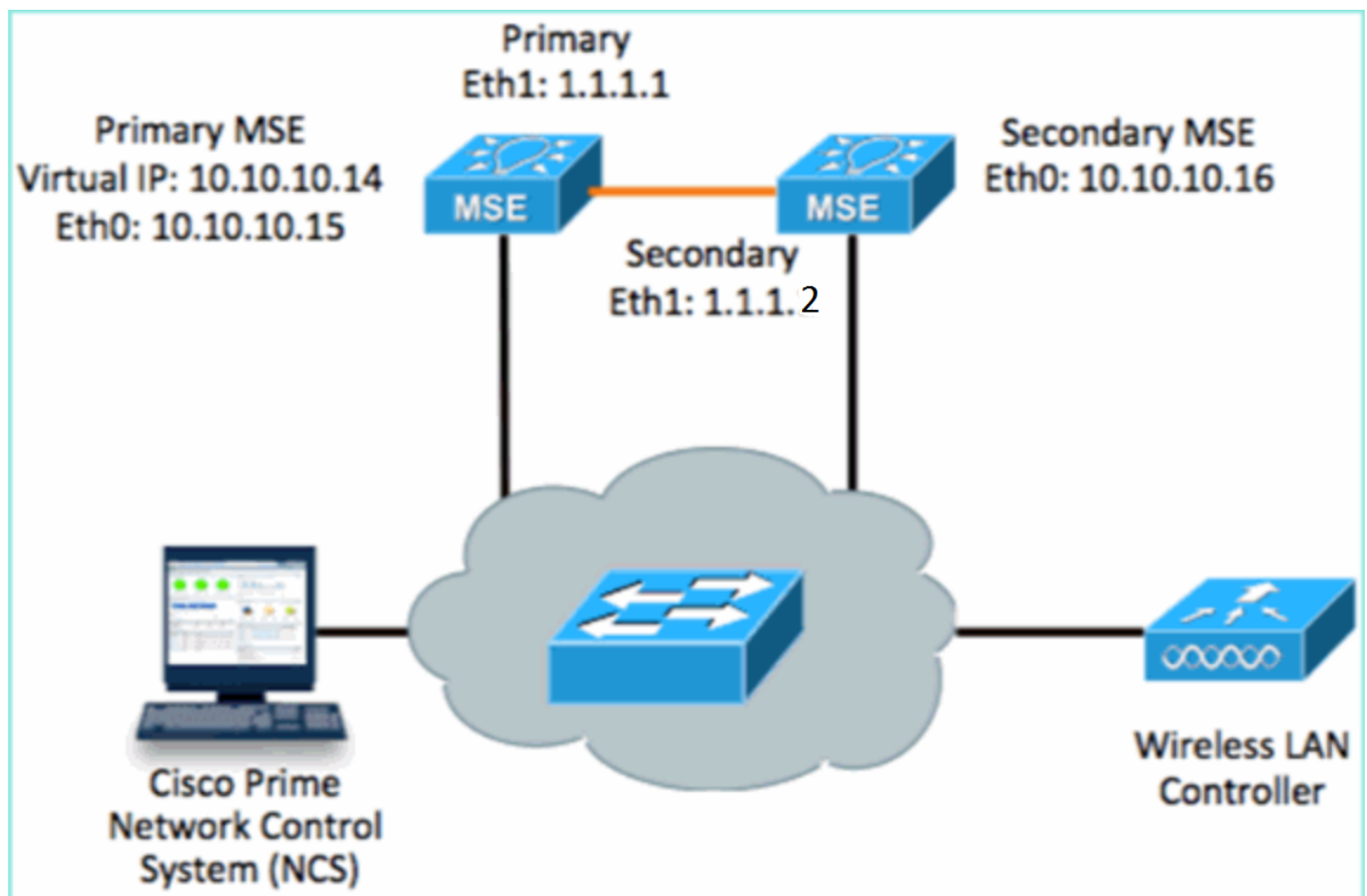
1. 設定主MSE。安裝指令碼中的配置摘要:
   ```
   -------BEGIN---------
   Host name=mse3355-1
   Role=1 [Primary]
   ```
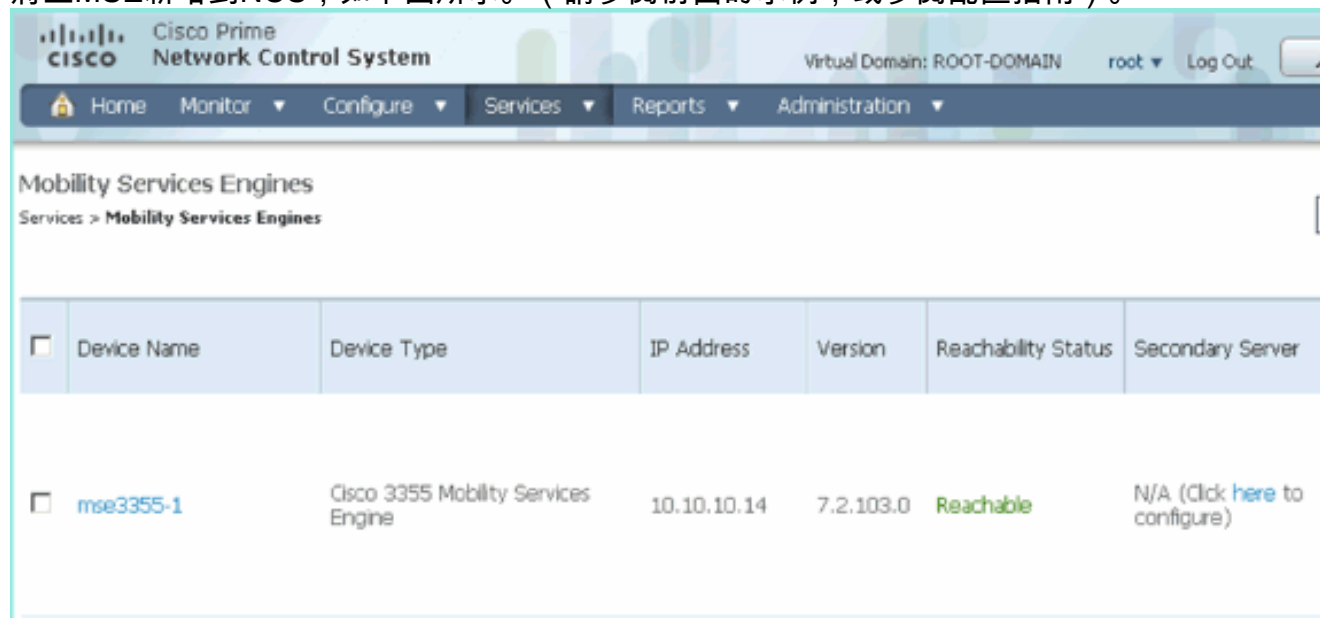
```
Health Monitor Interface=eth0
Direct connect interface=eth1
Virtual IP Address=10.10.10.14
Virtual IP Netmask=255.255.255.0
Eth1 IP address=1.1.1.1
Eth1 network mask=255.0.0.0
Default Gateway =10.10.10.1
-------END--------
```

2. 設定輔助MSE。安裝指令碼中的配置摘要：

```
-------BEGIN--------
Host name=mse3355-2
Role=2 [Secondary]
Health Monitor Interface=eth0
Direct connect interface=eth1
Eth0 IP Address 10.10.10.16
Eth0 network mask=255.255.255.0
Default Gateway=10.10.10.1
Eth1 IP address=1.1.1.2,
Eth1 network mask=255.0.0.0
-------END--------
```

3. 將主MSE新增到NCS，如下圖所示。（請參閱前面的示例，或參閱配置指南）。

4. 要設定輔助MSE，請導航到NCS > configure Secondary Server。輸入輔助裝置名稱-
   [mse3355-2]輔助IP地址- [10.10.10.16]完成其餘引數並按一下Save，如下圖所示。

HA Configuration : mse3355-1

Services > Mobility Services Engines > System > Services High Availabili

Configure High Availability Parameters

Primary Health Monitor IP	10.10.10.15
Secondary Device Name	mse3355-2
Secondary IP Address	10.10.10.16
Secondary Password	•••••
Failover Type	Manual
Failback Type	Manual
Long Failover Wait	10 seconds

Save

5. 按一下「**OK**」以確認兩個MSE的配對，如下圖所示。

The page at https://10.10.10.20 says:

Are you sure you want to pair up these two servers?

OK   Cancel
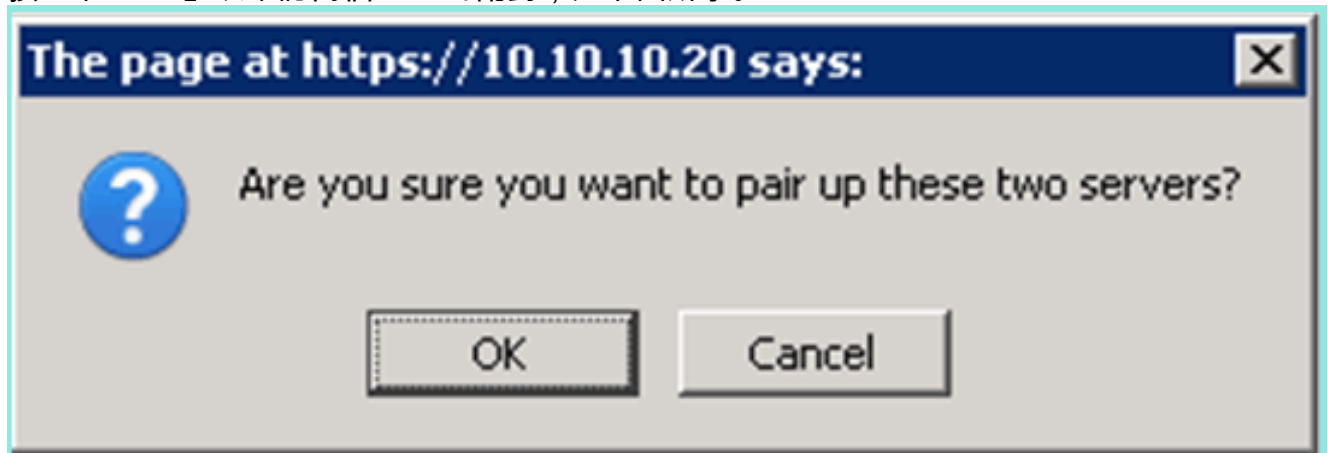
NCS需要一段時間才能新增輔助伺服器配置，如下圖所示。

Please Wait. High Availability configuration is being created at the Primary and Secondary servers. This will take a few seconds....

• • • • •
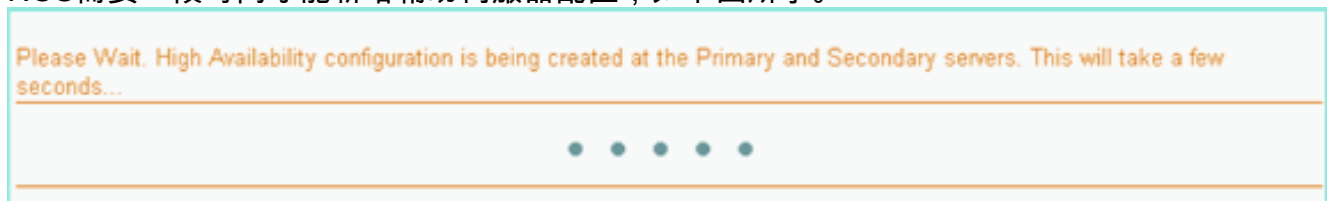
6. 完成後，對HA引數進行任何更改。按一下「**Save**」，如下圖所示。

HA Configuration : mse3355-1

Services > Mobility Services Engines > System > Services High Availability > **Configure High Availability Parameters**

Configuration

Primary Health Monitor IP	10.10.10.15
Secondary Device Name	mse3355-2
Secondary IP Address	10.10.10.16
Secondary Password	•••••
Secondary Platform UDI	AIR-MSE-3355-K9:V01:KQ-
Failover Type	Manual ▼
Failback Type	Manual ▼
Long Failover Wait	10 seconds

[Save] [Delete] [Switchover]

7. 檢視新MSE HA配對的即時進度的HA狀態,如下圖所示。

8. 導覽至NCS > Services > Mobility Services > Mobility Services Engine,確認已將MSE(直接連線)HA新增到NCS,如下圖所示。

9. 在控制檯中，也可使用gethainfo命令檢視確認。以下是主要和次要輸出：

```
[root@mse3355-1 ~]#gethainfo

Health Monitor is running. Retrieving HA related information


-------------------------------------------------------
Base high availability configuration for this server
-------------------------------------------------------

Server role: Primary
Health Monitor IP Address: 10.10.10.15
Virtual IP Address: 10.10.10.14
Version: 7.2.103.0
UDI: AIR-MSE-3355-K9:V01:KQ37xx
Number of paired peers: 1


----------------------------
Peer configuration#: 1
----------------------------

Health Monitor IP Address 10.10.10.16
Virtual IP Address: 10.10.10.14
Version: 7.2.103.0
UDI: AIR-MSE-3355-K9:V01:KQ45xx
Failover type: Automatic
Failback type: Manual
Failover wait time (seconds): 10
Instance database name: mseos3s
Instance database port: 1624
Dataguard configuration name: dg_mse3
Primary database alias: mseop3s
Direct connect used: Yes
Heartbeat status: Up
Current state: PRIMARY_ACTIVE

[root@mse3355-2 ~]#gethainfo

Health Monitor is running. Retrieving HA related information


-------------------------------------------------------
Base high availability configuration for this server
-------------------------------------------------------

Server role: Secondary
Health Monitor IP Address: 10.10.10.16
```

```
Virtual IP Address: Not Applicable for a secondary
Version: 7.2.103.0
UDI: AIR-MSE-3355-K9:V01:KQ45xx
Number of paired peers: 1


---------------------------
Peer configuration#: 1
---------------------------

Health Monitor IP Address 10.10.10.15
Virtual IP Address: 10.10.10.14
Version: 7.2.103.0
UDI: AIR-MSE-3355-K9:V01:KQ37xx
Failover type: Automatic
Failback type: Manual
Failover wait time (seconds): 10
Instance database name: mseos3
Instance database port: 1524
Dataguard configuration name: dg_mse3
Primary database alias: mseop3s
Direct connect used: Yes
Heartbeat status: Up
Current state: SECONDARY_ACTIVE
```

MSE物理裝置的HA配置方案

根據配對矩陣，HA配置中的最大值為2:1。這是為MSE-3355保留的，在輔助模式下，MSE-3310和MSE-3350可以支援。直接連線在此場景中不適用。
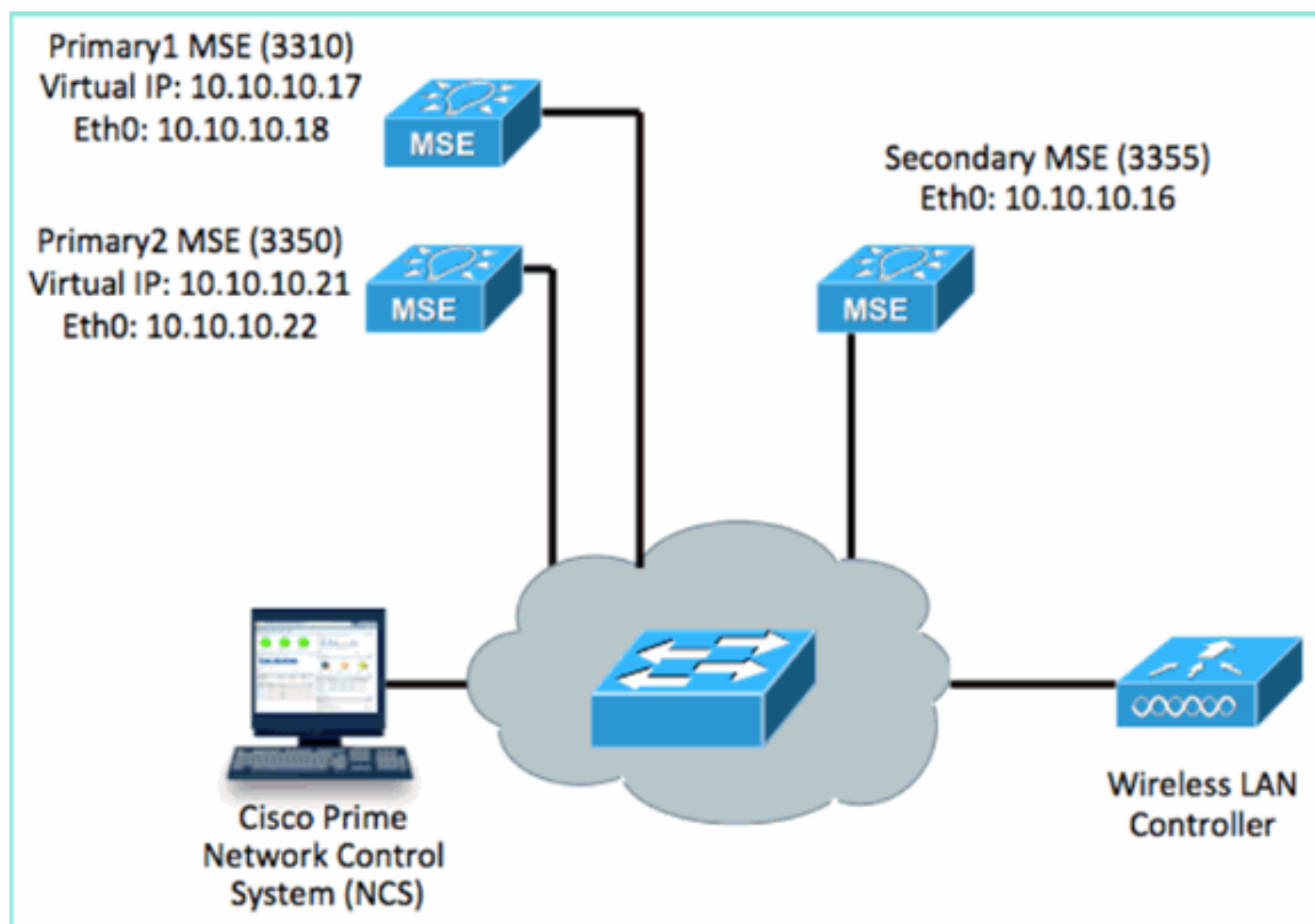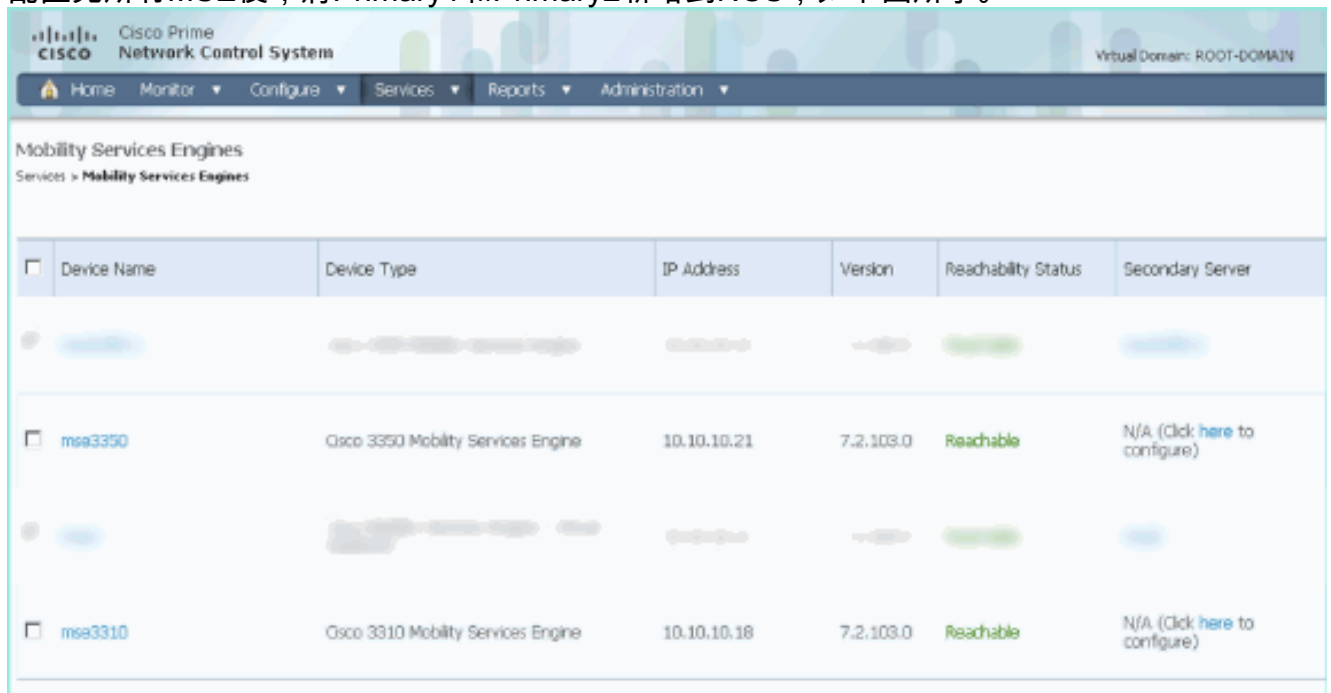
1. 配置每個MSE以演示2:1高可用性場景：

```
MSE-3310 (Primary1)
Server role: Primary
Health Monitor IP Address (Eth0): 10.10.10.17
Virtual IP Address: 10.10.10.18
Eth1 – Not Applicable

MSE-3350 (Primary2)
Server role: Primary
Health Monitor IP Address: 10.10.10.22
Virtual IP Address: 10.10.10.21
Eth1 – Not Applicable

MSE-3355 (Secondary)
Server role: Secondary
Health Monitor IP Address: 10.10.10.16
Virtual IP Address: Not Applicable for a secondary
```

2. 配置完所有MSE後，將Primary1和Primary2新增到NCS，如下圖所示。

3. 按一下以配置輔助伺服器（如前面的示例所示）。 從任一主要MSE開始，如下圖所示。

Reachability Status	Secondary Server
Reachable	N/A (Click here to configure)
Reachable	N/A (Click here to configure)

4. 輸入輔助MSE的引數：輔助裝置名稱：例如[mse-3355-2]輔助IP地址- [10.10.10.16]完成其餘引數。按一下「Save」，如下圖所示。

HA Configuration : mse3350

Services > Mobility Services Engines > System > Services High Availability > **Configure High Availability Parameters**

Configuration

Primary Health Monitor IP	10.10.10.22
Secondary Device Name	mse3355-2
Secondary IP Address	10.10.10.16
Secondary Password ⓘ	●●●●●
Secondary Platform UDI	AIR-MSE-3355-K9:V01:KQ4
Failover Type ⓘ	Manual ▼
Failback Type ⓘ	Manual ▼
Long Failover Wait ⓘ	10 seconds

[Save] [Delete] [Switchover]

5. 請稍等片刻，等待配置第一個輔助項目，如下圖所示。

Please Wait. High Availability configuration is being created at the Primary and Secondary servers. This will take a few seconds...

6. 確認已為第一個主MSE新增輔助伺服器，如下圖所示。

Mobility Services Engines
Services > **Mobility Services Engines**

Device Name	Device Type	IP Address	Version	Reachability Status	Secondary Server
mse3350	Cisco 3350 Mobility Services Engine	10.10.10.21	7.2.103.0	Reachable	mse3355-2

7. 對第二個主MSE重複步驟3到6，如下圖所示。

Mobility Services Engines
Services > **Mobility Services Engines**

Device Name	Device Type	IP Address	Version	Reachability Status	Secondary Server
mse3350	Cisco 3350 Mobility Services Engine	10.10.10.21	7.2.103.0	Reachable	mse3355-2
mse3310	Cisco 3310 Mobility Services Engine	10.10.10.18	7.2.103.0	Reachable	N/A (Click here to configure)

8. 最終確定第二個主MSE的HA參數，如下圖所示。

HA Configuration : mse3310
Services > Mobility Services Engines > System > Services High Availability > **Configure High Availability Parameters**

Configure High Availability Parameters

Primary Health Monitor IP	10.10.10.17
Secondary Device Name	mse3355-2
Secondary IP Address	10.10.10.16
Secondary Password ⓘ	•••••
Failover Type ⓘ	Manual ▾
Failback Type ⓘ	Manual ▾
Long Failover Wait ⓘ	10 seconds

Save

9. 保存設定，如下圖所示。

HA Configuration : mse3310
Services > Mobility Services Engines > System > Services High Availability > **Configure High Availability Parameters**

Configuration

Primary Health Monitor IP	10.10.10.17
Secondary Device Name	mse3355-2
Secondary IP Address	10.10.10.16
Secondary Password ⓘ	•••••
Secondary Platform UDI	AIR-MSE-3355-K9:V01:KQ-
Failover Type ⓘ	Manual ▾
Failback Type ⓘ	Manual ▾
Long Failover Wait ⓘ	10 seconds

Save   Delete   Switchover

10. 檢查每個主MSE的進度狀態，如下圖所示。

11. 確認主MSE和主MSE均使用輔助MSE設定，如下圖所示。
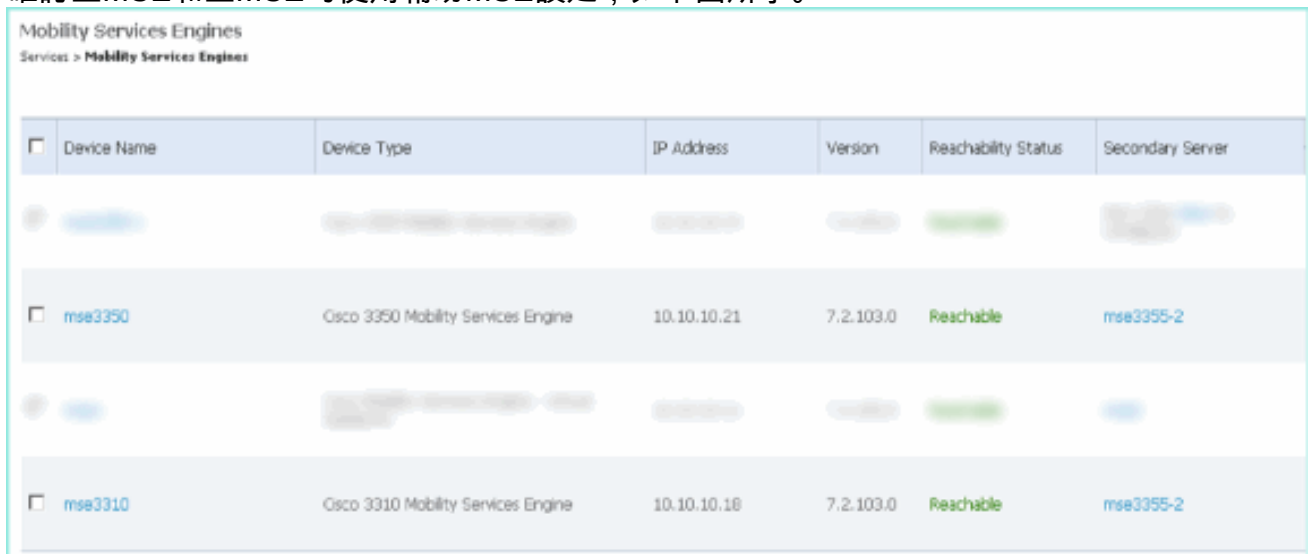
12. 導覽至NCS > Services > Mobility Services，選擇High Availability，如下圖所示。
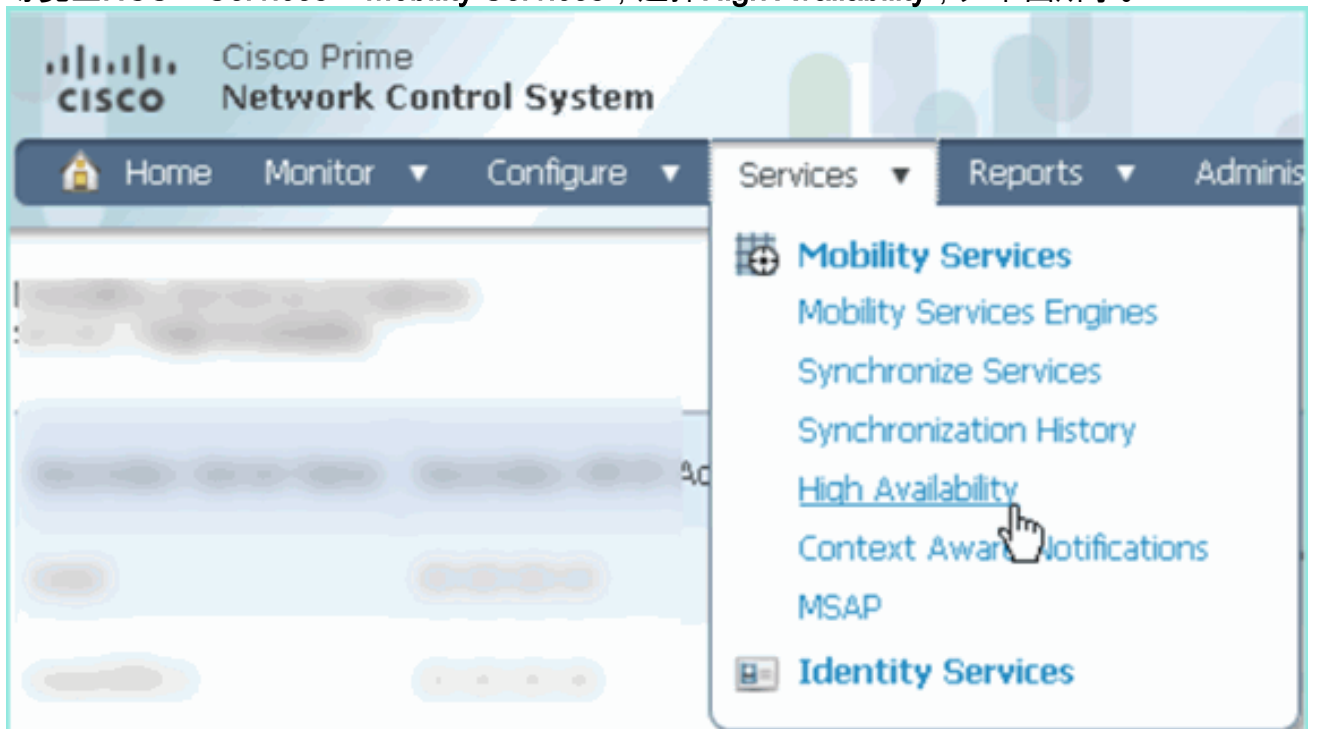
請注意，已確認MSE-3355的2:1為MSE-3310和MSE-3350的次要，如下圖所示。

以下是使用gethainfo指令時，所有三個MSE的控制檯上的HA設定輸出範例：

```
[root@mse3355-2 ~]#gethainfo

Health Monitor is running. Retrieving HA related information

-----------------------------------------------------
Base high availability configuration for this server
-----------------------------------------------------

Server role: Secondary
Health Monitor IP Address: 10.10.10.16
Virtual IP Address: Not Applicable for a secondary
Version: 7.2.103.0
UDI: AIR-MSE-3355-K9:V01:KQ45xx
Number of paired peers: 2

----------------------------
Peer configuration#: 1
----------------------------

Health Monitor IP Address 10.10.10.22
Virtual IP Address: 10.10.10.21
Version: 7.2.103.0
UDI: AIR-MSE-3350-K9:V01:MXQ839xx
Failover type: Manual
Failback type: Manual
Failover wait time (seconds): 10
Instance database name: mseos3
Instance database port: 1524
Dataguard configuration name: dg_mse3
Primary database alias: mseop3s
Direct connect used: No
Heartbeat status: Up
Current state: SECONDARY_ACTIVE


----------------------------
Peer configuration#: 2
----------------------------

Health Monitor IP Address 10.10.10.17
Virtual IP Address: 10.10.10.18
Version: 7.2.103.0
UDI: AIR-MSE-3310-K9:V01:FTX140xx
Failover type: Manual
Failback type: Manual
Failover wait time (seconds): 10
Instance database name: mseos4
Instance database port: 1525
```

```
Dataguard configuration name: dg_mse4
Primary database alias: mseop4s
Direct connect used: No
Heartbeat status: Up
Current state: SECONDARY_ACTIVE
```

NCS中HA的最終驗證顯示MSE-3310和MSE-3350的狀態均為完全活動，如下圖所示。

驗證

目前沒有適用於此組態的驗證程序。

MSE HA的基本故障排除

本節提供的資訊可用於對組態進行疑難排解。

新增輔助MSE時，可以看到如下圖所示的提示。
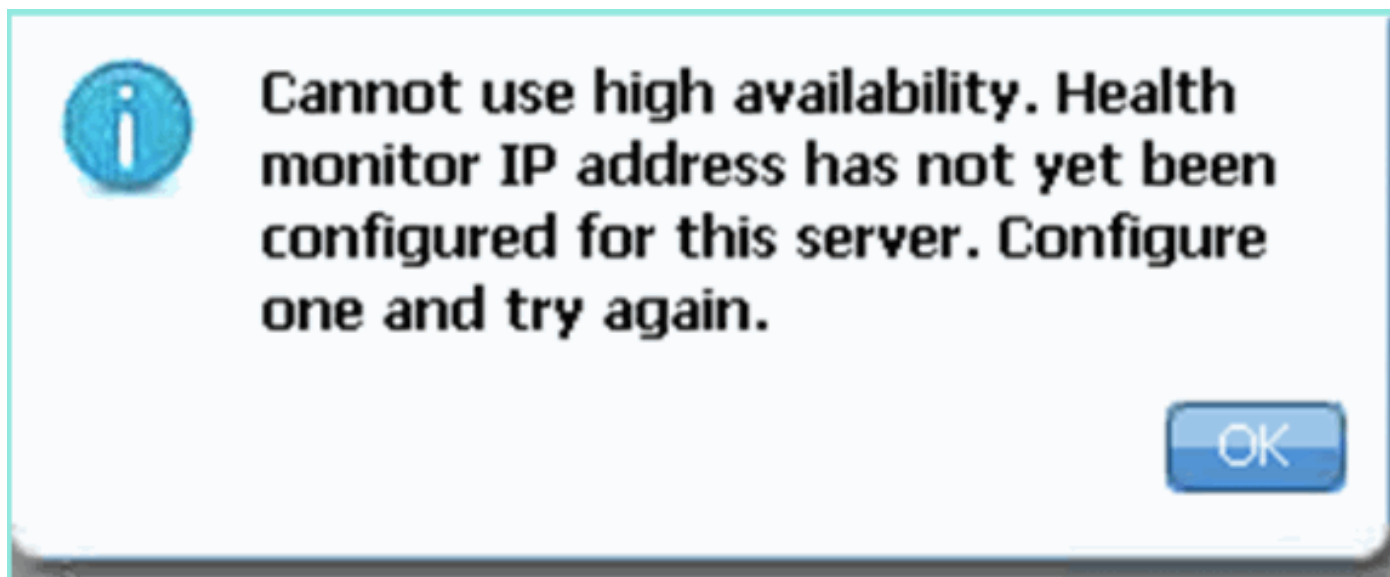
安裝指令碼期間可能存在問題。

- 運行**getserverinfo**命令以檢查網路設定是否正確。
- 服務也可能尚未啟動。運行**/init.d/msed start**命令。
- 如果需要，請再次運行安裝指令碼(**/mse/setup/setup.sh**)，並在最後儲存。

MSE的VA還需要啟用許可證(L-MSE-7.0-K9)。 否則，新增輔助MSE VA時，NCS會提示。獲取並新增MSE VA的啟用許可證，如下圖所示。
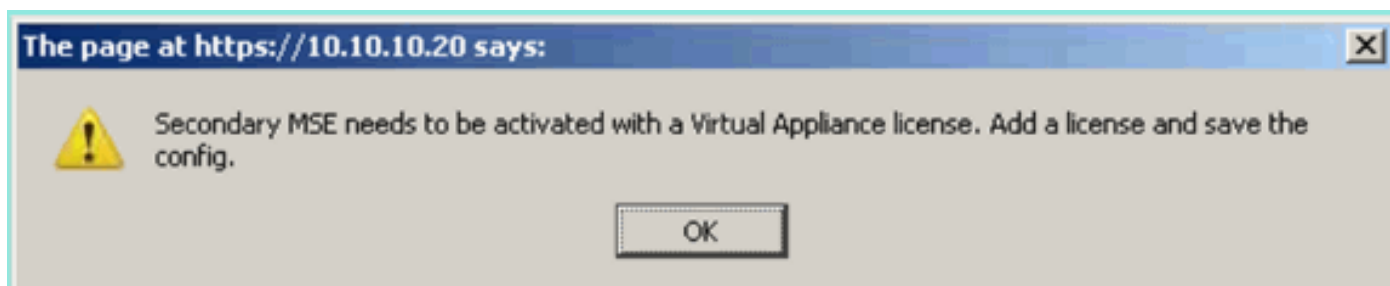
如果在MSE上交換HA角色，請確保服務已完全停止。因此，請使用**/init.d/msed stop**命令停止服務，然後再次運行安裝指令碼(**/mse/setup/setup.sh**),如下圖所示。
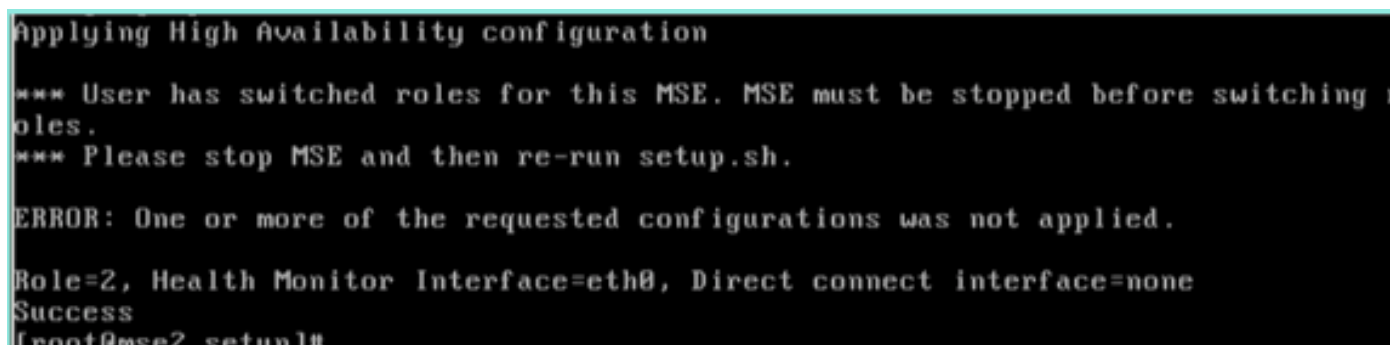
運行**gethainfo**命令以獲取MSE上的HA資訊。這為排除或監控HA狀態和更改提供了有用的資訊。

```
[root@mse3355-2 ~]#gethainfo
```

```
Health Monitor is running. Retrieving HA related information


------------------------------------------------------
Base high availability configuration for this server
------------------------------------------------------


Server role: Secondary
Health Monitor IP Address: 10.10.10.16
Virtual IP Address: Not Applicable for a secondary
Version: 7.2.103.0
UDI: AIR-MSE-3355-K9:V01:KQ45xx
Number of paired peers: 2


----------------------------
Peer configuration#: 1
----------------------------


Health Monitor IP Address 10.10.10.22
Virtual IP Address: 10.10.10.21
Version: 7.2.103.0
UDI: AIR-MSE-3350-K9:V01:MXQ839xx
Failover type: Manual
Failback type: Manual
Failover wait time (seconds): 10
Instance database name: mseos3
Instance database port: 1524
Dataguard configuration name: dg_mse3
Primary database alias: mseop3s
Direct connect used: No
Heartbeat status: Up
Current state: SECONDARY_ACTIVE


----------------------------
Peer configuration#: 2
----------------------------


Health Monitor IP Address 10.10.10.17
Virtual IP Address: 10.10.10.18
Version: 7.2.103.0
UDI: AIR-MSE-3310-K9:V01:FTX140xx
Failover type: Manual
Failback type: Manual
Failover wait time (seconds): 10
Instance database name: mseos4
Instance database port: 1525
Dataguard configuration name: dg_mse4
Primary database alias: mseop4s
Direct connect used: No
Heartbeat status: Up
Current state: SECONDARY_ACTIVE
```
此外，NCS HA View是一個極好的管理工具，可用於檢視MSE的HA設定，如下圖所示。
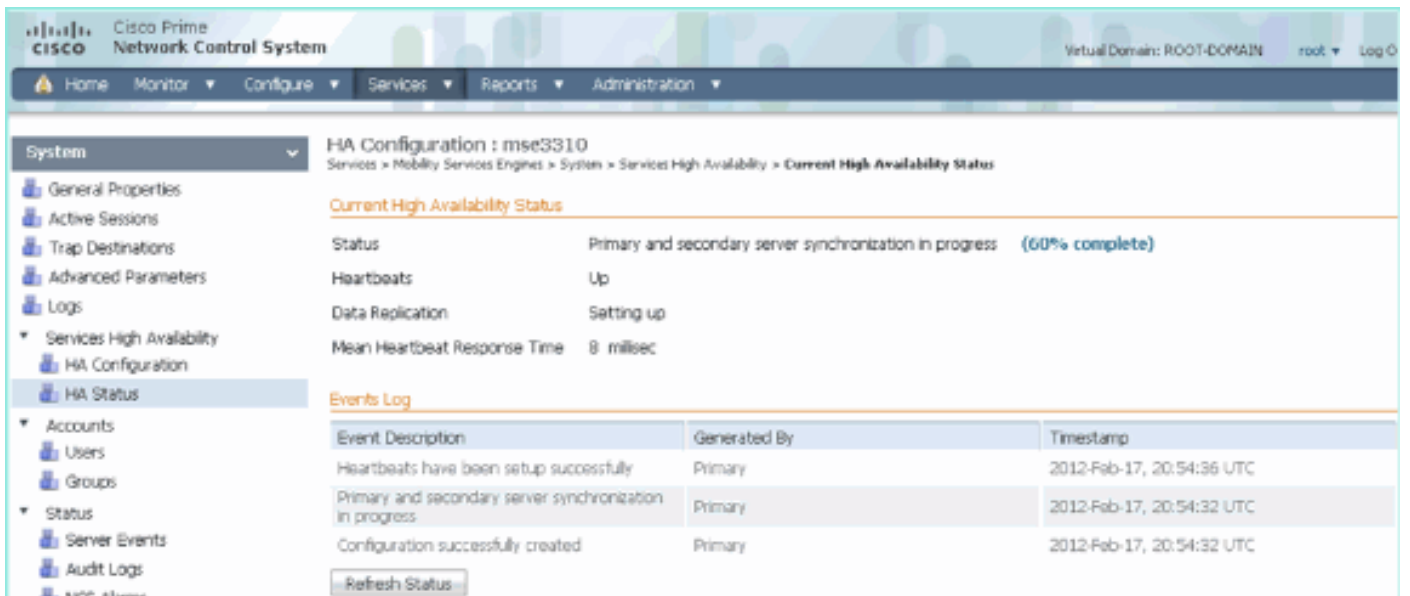
故障轉移/故障回覆場景

僅在手動故障切換/回切的情況下發生的情況，以便更好地控制。

主裝置已啟動，輔助裝置已準備好接管

配置MSE HA並啟動並運行後，Prime上的狀態如下圖所示:

Current High Availability Status

Status	Active
Heartbeats	Up
Data Replication	Up
Mean Heartbeat Response Time	12 millisec

Events Log

Event Description	Generated By	Timestamp
Active	Primary	2015-Mar-08, 12:50:17 CET
Heartbeats have been setup successfully	Primary	2015-Mar-08, 12:39:17 CET
Primary and secondary server synchronization in progress	Primary	2015-Mar-08, 12:39:13 CET
Configuration successfully created	Primary	2015-Mar-08, 12:39:11 CET

以下是主MSE的getserverinfo和gethainfo:

```
[root@NicoMSE ~]# getserverinfo
Health Monitor is running
Retrieving MSE Services status.
MSE services are up, getting the status
```

```
-------------
Server Config
-------------


Product name: Cisco Mobility Service Engine
Version: 8.0.110.0
Health Monitor Ip Address: 10.48.39.238
High Availability Role: 1
Hw Version: V01
Hw Product Identifier: AIR-MSE-VA-K9
Hw Serial Number: NicoMSE_b950a7c0-b68c-11e4-99d9-005056993b63
HTTPS: null
Legacy Port: 8001
Log Modules: -1
Log Level: INFO
Days to keep events: 2
Session timeout in mins: 30
DB backup in days: 2


-------------
Services
-------------


Service Name: Context Aware Service
Service Version: 8.0.1.79
Admin Status: Disabled
Operation Status: Down

Service Name: WIPS
Service Version: 3.0.8155.0
Admin Status: Enabled
Operation Status: Up

Service Name: Mobile Concierge Service
Service Version: 5.0.1.23
Admin Status: Disabled
Operation Status: Down

Service Name: CMX Analytics
Service Version: 3.0.1.68
Admin Status: Disabled
Operation Status: Down

Service Name: CMX Connect & Engage
Service Version: 1.0.0.29
Admin Status: Disabled
Operation Status: Down

Service Name: HTTP Proxy Service
Service Version: 1.0.0.1
Admin Status: Disabled
Operation Status: Down


--------------
Server Monitor
--------------



Server start time: Sun Mar 08 12:40:32 CET 2015
Server current time: Sun Mar 08 14:04:30 CET 2015
Server timezone: Europe/Brussels
Server timezone offset (mins): 60
Restarts: 1
Used Memory (MB): 197
```

```
Allocated Memory (MB): 989
Max Memory (MB): 989
DB disk size (MB): 17191

---------------
Active Sessions
---------------


Session ID: 5672
Session User ID: 1
Session IP Address: 10.48.39.238
Session start time: Sun Mar 08 12:44:54 CET 2015
Session last access time: Sun Mar 08 14:03:46 CET 2015


---------------------------
Default Trap Destinations
---------------------------


Trap Destination - 1
----------------
IP Address: 10.48.39.225
Last Updated: Sun Mar 08 12:34:12 CET 2015



[root@NicoMSE ~]# gethainfo

Health Monitor is running. Retrieving HA related information

------------------------------------------------------
Base high availability configuration for this server
------------------------------------------------------


Server role: Primary
Health Monitor IP Address: 10.48.39.238
Virtual IP Address: 10.48.39.224
Version: 8.0.110.0
UDI: AIR-MSE-VA-K9:V01:NicoMSE_b950a7c0-b68c-11e4-99d9-005056993b63
Number of paired peers: 1

---------------------------
Peer configuration#: 1
---------------------------


Health Monitor IP Address 10.48.39.240
Virtual IP Address: 10.48.39.224
Version: 8.0.110.0
UDI: AIR-MSE-VA-K9:V01:NicoMSE2_1c6b1940-b6a5-11e4-b017-005056993b66
Failover type: Manual
Failback type: Manual
Failover wait time (seconds): 10
Instance database name: mseos3s
Instance database port: 1624
Dataguard configuration name: dg_mse3
Primary database alias: mseop3s
Direct connect used: No
Heartbeat status: Up
Current state: PRIMARY_ACTIVE
```

辅助MSE的情况也是如此：


```
[root@NicoMSE2 ~]# getserverinfo
Health Monitor is running
Retrieving MSE Services status.
```

MSE services are up and in DORMANT mode, getting the status

Server Config

Product name: Cisco Mobility Service Engine
Version: 8.0.110.0
Health Monitor Ip Address: 10.48.39.240
High Availability Role: 2
Hw Version: V01
Hw Product Identifier: AIR-MSE-VA-K9
Hw Serial Number: NicoMSE2_1c6b1940-b6a5-11e4-b017-005056993b66
HTTPS: null
Legacy Port: 8001
Log Modules: -1
Log Level: INFO
Days to keep events: 2
Session timeout in mins: 30
DB backup in days: 2

Services

Service Name: Context Aware Service
Service Version: 8.0.1.79
Admin Status: Disabled
Operation Status: Down

Service Name: WIPS
Service Version: 3.0.8155.0
Admin Status: Enabled
Operation Status: Up

Service Name: Mobile Concierge Service
Service Version: 5.0.1.23
Admin Status: Disabled
Operation Status: Down

Service Name: CMX Analytics
Service Version: 3.0.1.68
Admin Status: Disabled
Operation Status: Down

Service Name: CMX Connect & Engage
Service Version: 1.0.0.29
Admin Status: Disabled
Operation Status: Down

Service Name: HTTP Proxy Service
Service Version: 1.0.0.1
Admin Status: Disabled
Operation Status: Down

Server Monitor

Server start time: Sun Mar 08 12:50:04 CET 2015
Server current time: Sun Mar 08 14:04:32 CET 2015
Server timezone: Europe/Brussels

```
Server timezone offset (mins): 60
Restarts: null
Used Memory (MB): 188
Allocated Memory (MB): 989
Max Memory (MB): 989
DB disk size (MB): 17191
[root@NicoMSE2 ~]# gethainfo

Health Monitor is running. Retrieving HA related information


------------------------------------------------------
Base high availability configuration for this server
------------------------------------------------------

Server role: Secondary
Health Monitor IP Address: 10.48.39.240
Virtual IP Address: Not Applicable for a secondary
Version: 8.0.110.0
UDI: AIR-MSE-VA-K9:V01:NicoMSE2_1c6b1940-b6a5-11e4-b017-005056993b66
Number of paired peers: 1


----------------------------
Peer configuration#: 1
----------------------------

Health Monitor IP Address 10.48.39.238
Virtual IP Address: 10.48.39.224
Version: 8.0.110.0
UDI: AIR-MSE-VA-K9:V01:NicoMSE_b950a7c0-b68c-11e4-99d9-005056993b63
Failover type: Manual
Failback type: Manual
Failover wait time (seconds): 10
Instance database name: mseos3
Instance database port: 1524
Dataguard configuration name: dg_mse3
Primary database alias: mseop3s
Direct connect used: No
Heartbeat status: Up
Current state: SECONDARY_ACTIVE
```

故障轉移到輔助裝置

為了手動觸發，您在Prime Infrastructure中進入MSE HA配置，然後點選Switchover。

很快，兩台伺服器上的gethainfo都將轉換為FAILOVER_INVOKED

primary gethainfo:

```
[root@NicoMSE ~]# gethainfo

Health Monitor is running. Retrieving HA related information


------------------------------------------------------
Base high availability configuration for this server
------------------------------------------------------

Server role: Primary
Health Monitor IP Address: 10.48.39.238
Virtual IP Address: 10.48.39.224
Version: 8.0.110.0
```

```
UDI: AIR-MSE-VA-K9:V01:NicoMSE_b950a7c0-b68c-11e4-99d9-005056993b63
Number of paired peers: 1


----------------------------
Peer configuration#: 1
----------------------------


Health Monitor IP Address 10.48.39.240
Virtual IP Address: 10.48.39.224
Version: 8.0.110.0
UDI: AIR-MSE-VA-K9:V01:NicoMSE2_1c6b1940-b6a5-11e4-b017-005056993b66
Failover type: Manual
Failback type: Manual
Failover wait time (seconds): 10
Instance database name: mseos3s
Instance database port: 1624
Dataguard configuration name: dg_mse3
Primary database alias: mseop3s
Direct connect used: No
Heartbeat status: Down
Current state: FAILOVER_INVOKED
```

輔助gethainfo:

```
[root@NicoMSE2 ~]# gethainfo

Health Monitor is running. Retrieving HA related information

-------------------------------------------------------
Base high availability configuration for this server
-------------------------------------------------------


Server role: Secondary
Health Monitor IP Address: 10.48.39.240
Virtual IP Address: Not Applicable for a secondary
Version: 8.0.110.0
UDI: AIR-MSE-VA-K9:V01:NicoMSE2_1c6b1940-b6a5-11e4-b017-005056993b66
Number of paired peers: 1


----------------------------
Peer configuration#: 1
----------------------------


Health Monitor IP Address 10.48.39.238
Virtual IP Address: 10.48.39.224
Version: 8.0.110.0
UDI: AIR-MSE-VA-K9:V01:NicoMSE_b950a7c0-b68c-11e4-99d9-005056993b63
Failover type: Manual
Failback type: Manual
Failover wait time (seconds): 10
Instance database name: mseos3
Instance database port: 1524
Dataguard configuration name: dg_mse3
Primary database alias: mseop3s
Direct connect used: No
Heartbeat status: Down
Current state: FAILOVER_INVOKED
```

故障切換完成後，您將在Prime上看到以下映像：

| Status | Instance is in failover active state |

Events Log

Event Description	Generated By
Instance is in failover active state	Secondary
Failover invoked; starting application instance	Secondary
Failover has been invoked. Reconfiguring instance database	Secondary
Failover invoked; shutting down primary instance	Secondary

主要gethainfo：

```
[root@NicoMSE ~]# gethainfo

Health Monitor is not running. Following information is from the last saved configuration

-----------------------------------------------------
Base high availability configuration for this server
-----------------------------------------------------

Server role: Primary
Health Monitor IP Address: 10.48.39.238
Virtual IP Address: 10.48.39.224
Version: 8.0.110.0
UDI: AIR-MSE-VA-K9:V01:NicoMSE_b950a7c0-b68c-11e4-99d9-005056993b63
Number of paired peers: 1


----------------------------
Peer configuration#: 1
----------------------------

Health Monitor IP Address 10.48.39.240
Virtual IP Address: 10.48.39.224
Version: 8.0.110.0
UDI: AIR-MSE-VA-K9:V01:NicoMSE2_1c6b1940-b6a5-11e4-b017-005056993b66
Failover type: Manual
Failback type: Manual
Failover wait time (seconds): 10
Instance database name: mseos3s
Instance database port: 1624
Dataguard configuration name: dg_mse3
Primary database alias: mseop3s
Direct connect used: No
Last shutdown state: FAILOVER_ACTIVE
```
輔助：

```
[root@NicoMSE2 ~]# gethainfo
```

```
Health Monitor is running. Retrieving HA related information

------------------------------------------------------
Base high availability configuration for this server
------------------------------------------------------

Server role: Secondary
Health Monitor IP Address: 10.48.39.240
Virtual IP Address: Not Applicable for a secondary
Version: 8.0.110.0
UDI: AIR-MSE-VA-K9:V01:NicoMSE2_1c6b1940-b6a5-11e4-b017-005056993b66
Number of paired peers: 1

---------------------------
Peer configuration#: 1
---------------------------

Health Monitor IP Address 10.48.39.238
Virtual IP Address: 10.48.39.224
Version: 8.0.110.0
UDI: AIR-MSE-VA-K9:V01:NicoMSE_b950a7c0-b68c-11e4-99d9-005056993b63
Failover type: Manual
Failback type: Manual
Failover wait time (seconds): 10
Instance database name: mseos3
Instance database port: 1524
Dataguard configuration name: dg_mse3
Primary database alias: mseop3s
Direct connect used: No
Heartbeat status: Down
Current state: FAILOVER_ACTIVE
```

在此階段，故障切換已完成，輔助MSE完全負責。

需要注意的是，當您執行手動切換時，主MSE上的服務會停止（為了模擬主MSE斷開的真實事件）

如果恢復主映像，其狀態將為「TERMINATED」。 它是正常的，輔助節點仍然負責並顯示「FAILOVER_ACTIVE」

回切到主節點

在回切之前，您必須恢復主映像。

其狀態隨後為「已終止」：

```
[root@NicoMSE ~]# gethainfo

Health Monitor is running. Retrieving HA related information

------------------------------------------------------
Base high availability configuration for this server
------------------------------------------------------

Server role: Primary
Health Monitor IP Address: 10.48.39.238
Virtual IP Address: 10.48.39.224
Version: 8.0.110.0
UDI: AIR-MSE-VA-K9:V01:NicoMSE_b950a7c0-b68c-11e4-99d9-005056993b63
Number of paired peers: 1
```

```
---------------------------
Peer configuration#: 1
---------------------------


Health Monitor IP Address 10.48.39.240
Virtual IP Address: 10.48.39.224
Version: 8.0.110.0
UDI: AIR-MSE-VA-K9:V01:NicoMSE2_1c6b1940-b6a5-11e4-b017-005056993b66
Failover type: Manual
Failback type: Manual
Failover wait time (seconds): 10
Instance database name: mseos3s
Instance database port: 1624
Dataguard configuration name: dg_mse3
Primary database alias: mseop3s
Direct connect used: No
Heartbeat status: Down
Current state: TERMINATED
```

當您從Prime呼叫回切時，兩個節點都進入「FAILBACK ACTIVE」，該狀態不是最終狀態（與「failover active」相反）。

主要gethainfo：

```
[root@NicoMSE ~]# gethainfo

Health Monitor is running. Retrieving HA related information

-----------------------------------------------------
Base high availability configuration for this server
-----------------------------------------------------


Server role: Primary
Health Monitor IP Address: 10.48.39.238
Virtual IP Address: 10.48.39.224
Version: 8.0.110.0
UDI: AIR-MSE-VA-K9:V01:NicoMSE_b950a7c0-b68c-11e4-99d9-005056993b63
Number of paired peers: 1


---------------------------
Peer configuration#: 1
---------------------------


Health Monitor IP Address 10.48.39.240
Virtual IP Address: 10.48.39.224
Version: 8.0.110.0
UDI: AIR-MSE-VA-K9:V01:NicoMSE2_1c6b1940-b6a5-11e4-b017-005056993b66
Failover type: Manual
Failback type: Manual
Failover wait time (seconds): 10
Instance database name: mseos3s
Instance database port: 1624
Dataguard configuration name: dg_mse3
Primary database alias: mseop3s
Direct connect used: No
Heartbeat status: Down
Current state: FAILBACK_ACTIVE
```

輔助gethainfo:

```
[root@NicoMSE2 ~]# gethainfo
```

```
Health Monitor is running. Retrieving HA related information

------------------------------------------------------
Base high availability configuration for this server
------------------------------------------------------

Server role: Secondary
Health Monitor IP Address: 10.48.39.240
Virtual IP Address: Not Applicable for a secondary
Version: 8.0.110.0
UDI: AIR-MSE-VA-K9:V01:NicoMSE2_1c6b1940-b6a5-11e4-b017-005056993b66
Number of paired peers: 1

---------------------------
Peer configuration#: 1
---------------------------

Health Monitor IP Address 10.48.39.238
Virtual IP Address: 10.48.39.224
Version: 8.0.110.0
UDI: AIR-MSE-VA-K9:V01:NicoMSE_b950a7c0-b68c-11e4-99d9-005056993b63
Failover type: Manual
Failback type: Manual
Failover wait time (seconds): 10
Instance database name: mseos3
Instance database port: 1524
Dataguard configuration name: dg_mse3
Primary database alias: mseop3s
Direct connect used: No
Heartbeat status: Down
Current state: FAILBACK_ACTIVE
```

Prime顯示以下圖片:

Event Description	Generated By
Failback in progress; starting primary database instance	Secondary

當故障回覆完成，但輔助節點仍然忙於將資料傳回主節點時，主節點顯示:

```
 gethainfo

Health Monitor is running. Retrieving HA related information

------------------------------------------------------
Base high availability configuration for this server
------------------------------------------------------

Server role: Primary
Health Monitor IP Address: 10.48.39.238
Virtual IP Address: 10.48.39.224
Version: 8.0.110.0
UDI: AIR-MSE-VA-K9:V01:NicoMSE_b950a7c0-b68c-11e4-99d9-005056993b63
Number of paired peers: 1

---------------------------
Peer configuration#: 1
---------------------------

Health Monitor IP Address 10.48.39.240
```

```
Virtual IP Address: 10.48.39.224
Version: 8.0.110.0
UDI: AIR-MSE-VA-K9:V01:NicoMSE2_1c6b1940-b6a5-11e4-b017-005056993b66
Failover type: Manual
Failback type: Manual
Failover wait time (seconds): 10
Instance database name: mseos3s
Instance database port: 1624
Dataguard configuration name: dg_mse3
Primary database alias: mseop3s
Direct connect used: No
Heartbeat status: Up
Current state: FAILBACK_COMPLETE
```
輔助顯示：


```
[root@NicoMSE2 ~]# gethainfo

Health Monitor is running. Retrieving HA related information

-----------------------------------------------------
Base high availability configuration for this server
-----------------------------------------------------

Server role: Secondary
Health Monitor IP Address: 10.48.39.240
Virtual IP Address: Not Applicable for a secondary
Version: 8.0.110.0
UDI: AIR-MSE-VA-K9:V01:NicoMSE2_1c6b1940-b6a5-11e4-b017-005056993b66
Number of paired peers: 1


----------------------------
Peer configuration#: 1
----------------------------

Health Monitor IP Address 10.48.39.238
Virtual IP Address: 10.48.39.224
Version: 8.0.110.0
UDI: AIR-MSE-VA-K9:V01:NicoMSE_b950a7c0-b68c-11e4-99d9-005056993b63
Failover type: Manual
Failback type: Manual
Failover wait time (seconds): 10
Instance database name: mseos3
Instance database port: 1524
Dataguard configuration name: dg_mse3
Primary database alias: mseop3s
Direct connect used: No
Heartbeat status: Up
Current state: SECONDARY_ALONE
```
如圖所示：

Current High Availability Status

Status	Primary instance is not synchronized with the secondary server. In progress.
Heartbeats	Up
Data Replication	Up
Mean Heartbeat Response Time	13 millisec

Events Log

Event Description	Generated By
Heartbeats have been setup successfully	Primary

完成此操作後，所有狀態都將返回原始狀態：PRIMARY_ACTIVE、SECONDARY_ACTIVE和 Prime HA狀態再次顯示為新部署。

HA狀態矩陣

PRIMARY_ACTIVE	主MSE處於主、負責且一切正常時的狀態
SECONDARY_ACTIVE	輔助MSE處於開啟狀態但不負責時的狀態（主要仍然是），準備在需要時接管
FAILOVER_INVOKED	當發生故障切換時（即輔助MSE開始其服務載入主MSE的資料庫）顯示在兩個節
FAILOVER_ACTIVE	故障轉移的最終狀態。輔助MSE視為「啟動並運行」，而主MSE已關閉
已終止	MSE節點的狀態，該節點在關閉後恢復服務，並且不是負責節點（因此當服務重 這也意味著HA連結可能未啟動（例如其中一個MSE正在重新啟動或根本無法ping
FAILBACK_ACTIVE	與故障切換相反，這並不是故障切換的最後階段。這表示已呼叫故障恢復，並且
FAILBACK_COMPLETE	主節點重新掌管但仍在忙於從輔助MSE載入資料庫時的狀態
SECONDARY_ALONE	當故障回覆完成且主裝置負責但仍載入資料時輔助MSE的狀態
正常關閉	如果手動重新啟動或停止另一個MSE上的服務，則觸發此狀態，以防出現自動故

關於HA的重要評論和事實

- 在進行故障切換後不立即觸發故障恢復非常重要，反之亦然。資料庫需要30分鐘時間才能穩定
- HA配置檔案是/opt/mse/health-monitor/resources/config/中的base-ha-config.properties，但不應手動編輯（請改用setup.sh）。 但是如果有疑問，您可以檢視
- HA不能手動斷開。唯一簡單的方法是從Prime Infra刪除輔助MSE。任何其他方法（在輔助系統上運行setup.sh使其成為主裝置、解除安裝、更改ip ...）都將中斷資料庫和狀態機，並且您可能必須重新安裝兩個MSE

HA故障排除

與HA相關的日誌儲存在/opt/mse/logs/hm目錄下，其中health-monitor*.log為主日誌檔案。

問題：初級與次級均處於活動狀態（分裂大腦狀態）

1.關閉輔助交換機上的虛擬IP介面(VIP)。它將eth0:1 ifconfig eth0:1關閉

2.重新啟動輔助MSE上的服務

服務msed stop
service msed start

3.驗證輔助節點是否已開始從Prime基礎設施與主節點同步返回。

問題：輔助節點與用於HA的主節點的同步長時間停滯在X%

1.停止輔助節點上的服務

服務msed stop

2.刪除 /opt/mse/health-monitor/resources/config/advance-cconfig-<IP-address-of-Primary>.properties 輔助伺服器上的檔案。

3.如果在建立HA時仍存在問題，則它可能會進入不一致狀態，在這種狀態下，我們必須使用**rm -rf /opt/data/*刪除輔助節點上「data」目錄下的所有內容**

4.重新啟動輔助節點。將其從Prime基礎設施新增到主基礎設施以再次啟動HA。

問題：在PI無法訪問輔助伺服器後，無法將其刪除

1.停止主節點上的服務。

2.刪除 /opt/mse/health-monitor/resources/config/advance-cconfig-<IP-address-of-Primary>.properties 主目錄中的檔案。

3.重新啟動主伺服器上的服務。

4.從PI中刪除主MSE並重新新增它。