

在CUCM和IM&上配置并排除NTP故障；P

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简介

本文档介绍适用于Cisco Unified Communications Manager(CUCM)的网络时间协议(NTP)。

先决条件

要求

本文档没有任何特定的要求。

使用的组件

本文档不限于特定的软件和硬件版本。

本文档中的信息都是基于特定实验室环境中的设备编写的。本文档中使用的所有设备最初均采用原始(默认)配置。如果您的网络处于活动状态，请确保您了解所有命令的潜在影响。

功能的用途

本文档介绍使用CUCM的NTP的用途、NTP的配置、收集哪些数据以进行故障排除、数据示例分析以及更多研究的相关资源。

使用CUCM的NTP旨在确保服务器知道正确的时间。CUCM服务器中的时间非常重要，因为互联网协议语音(VOIP)对时间变化非常敏感。CUCM群集必须保持时间同步，该时间同步必须紧靠群集中的其他服务器，这是因为数据库复制要求。

最后，排除故障的时间很重要，因为您希望在日志中包含正确的时间戳。

配置

请注意，CUCM需要某些NTP服务器。

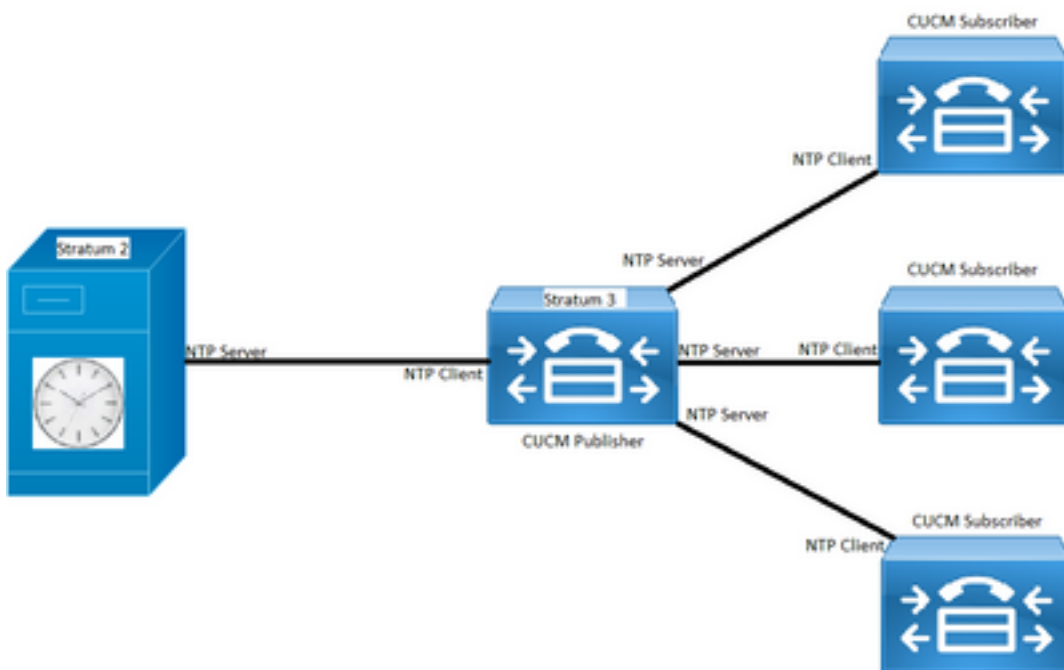
CUCM不支持Windows NTP服务器；但是，其他类型(如Linux NTP源、Cisco IOS® NTP源和Nexus OS NTP源)是可接受的。虽然其他思科解决方案可以将Windows Server用于NTP解决方案，但是CallManager、Cisco Unity以及即时消息和在线状态等UC解决方案无法使用，因此需要基于Linux或基于Cisco IOS®的NTP解决方案。这是因为Windows时间服务经常使用Linux系统难以同步的SNTP。

网络图

CUCM发布方需要不是CUCM集群成员的NTP源；因此，CUCM发布方会将其时间与NTP服务器同步。在此交换中，CUCM发布方是NTP客户端。

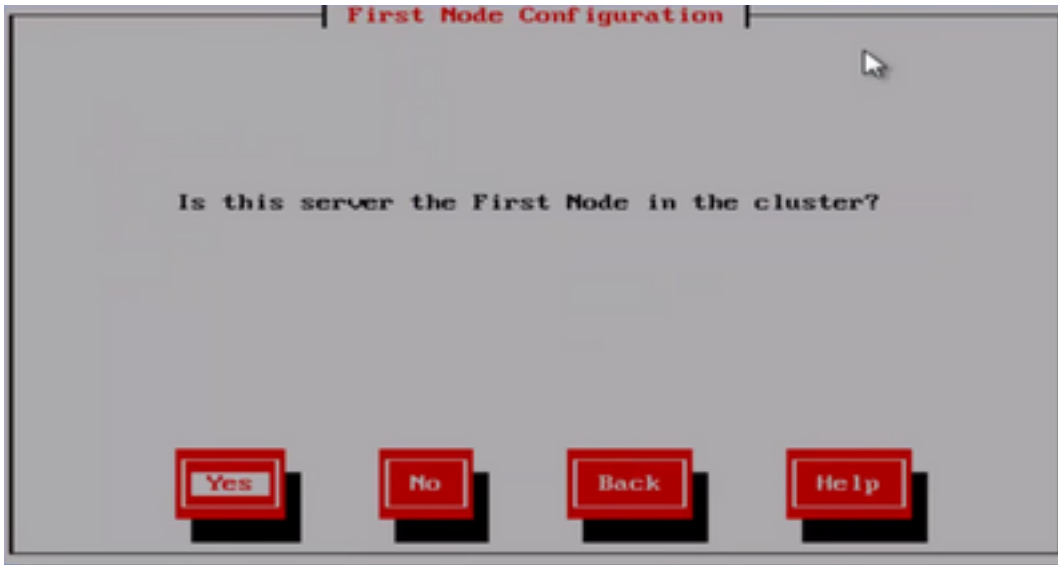
CUCM用户将其时间与CUCM发布者同步。在此交换中，CUCM发布方是CUCM用户作为NTP客户端的NTP服务器。

注意：请注意，思科即时消息和在线状态(IM&P)服务器也视为CUCM集群的用户，因此它们也依赖CUCM NTP。换句话说，如果NTP在IM&P服务器上不同步，则会导致系统中的数据库复制和高可用性问题的。

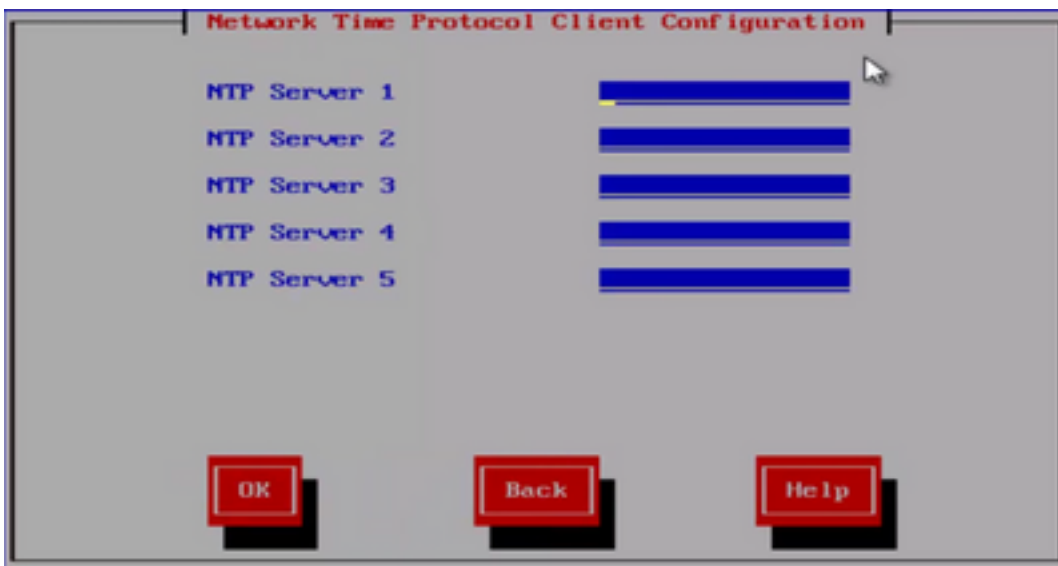


安装过程

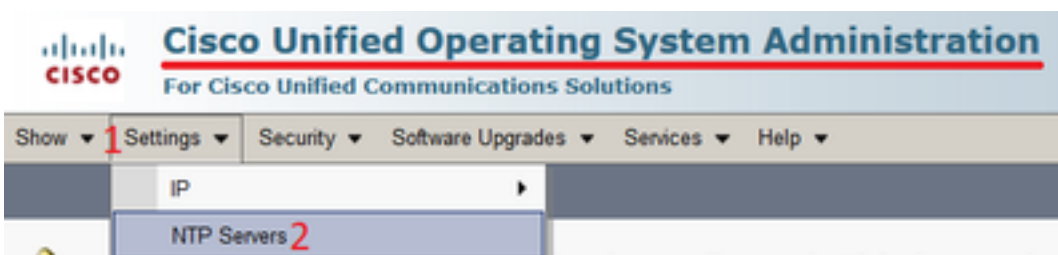
安装CUCM时，会提示确定服务器是否为群集中的第一个节点。



如果服务器不是群集中的第一个节点，则安装向导将经过NTP配置阶段；但是，如果是NTP服务器群集中的第一个节点，则系统会提示您输入NTP服务器。



安装后，使用OS管理员网页



安装后，使用命令行界面

如图所示，您可以找到用于访问和修改CUCM服务器中的NTP服务器的命令。

- 命令 `utils ntp server list` 显示系统上配置的NTP服务器。

```
admin:utils ntp server list
192.0.2.202
192.0.2.125

admin:
```

- 此命令 `utils ntp server add ntp_address` 将新的NTP服务器添加到系统。

```
admin:utils ntp server add 192.0.2.125
72.163.32.44 : added successfully.
Restarting NTP on the server.
admin:
```

注意：请记住，如果要添加新的NTP服务器，CUCM服务器会在添加之前测试可接通性，如果失败，则会显示下一个错误。

```
admin:utils ntp server add 191.0.2.81
191.0.2.81 : [ Inaccessible NTP server. Not added. ]
```

- `utils ntp server delete` 命令允许您删除系统中已配置的任何NTP。

```
admin:utils ntp server delete
1: 192.0.2.202
2: 192.0.2.125
a: all
q: quit

Choice: 2

Restart NTP (y/n): y

72.163.32.44 will be deleted from the list of configured NTP servers.
Continue (y/n)?y

72.163.32.44 : deleted successfully.
Restarting NTP on the server.
```

故障排除

要收集的数据

在对NTP问题进行故障排除时，您需要从具有NTP问题的任何CUCM服务器收集这些数据：

- 命令的输出会使用 `diagnose test`
- `utils ntp status` 的输出
- 从CUCM从思科实时监控工具(RTMT)收集的NTP日志

示例分析

例如，已使用CUCM发布器和NTP的下一个信息：

CUCM发布服务器

版本:11.5(1)SU5

FQDN:cucm-115.home.lab

IP地址以192.X.X.X开头

NTP

从Google NTP服务器

FQDN:time1.example.com.ntp

IP地址以216.X.X.X开头

CUCM的PCAP审核 — 无文件

注意端口号是123。这是NTP的端口。在文本框中的命令输出中，您可以看到NTP版本为4，如“NTPv4”中所述。您也可以注意到发布服务器，它在与“time1.example.com”建立通信时充当客户端；但是，它在与cucm-sub1、cucm-sub2和cucm-sub3建立通信时充当服务器。

From the CLI of the publisher run the command **"utils network capture port 123"**

Wait until you see traffic (this can take a little time, or it may be instant) then hit ctrl+c. Look in the traffic to find where your publisher is communicating with its NTP server and the NTP server is communication with the publisher (if the NTP server isn't replying then it is an issue in the network or with the NTP server). The primary focus of this output is the NTP version. In CUCM 9 and later NTP version 3 (NTPv3) can cause issues and an NTP source using NTPv4 should be the NTP server for the publisher.

```
admin:utils network capture size all count 10000000 port 123
Executing command with options:
  size=128                count=1000                interface=eth0
  src=dest=                port=123
  ip=
```

```
16:08:43.199710 IP cucm-sub3.home.lab.39417 > cucm-115.home.lab.ntp: NTPv4, Client, length 48
16:08:43.199737 IP cucm-115.home.lab.ntp > cucm-sub3.home.lab.39417: NTPv4, Server, length 48
16:08:43.199823 IP cucm-sub3.home.lab.39417 > cucm-115.home.lab.ntp: NTPv4, Client, length 48
16:08:43.199859 IP cucm-115.home.lab.ntp > cucm-sub3.home.lab.39417: NTPv4, Server, length 48
16:09:01.640980 IP cucm-115.home.lab.50141 > time1.example.com.ntp: NTPv4, Client, length 48
16:09:01.654675 IP time1.example.com.ntp > cucm-115.home.lab.50141: NTPv4, Server, length 48
16:09:01.654733 IP cucm-115.home.lab.50141 > time1.example.com.ntp: NTPv4, Client, length 48
16:09:01.667368 IP time1.example.com.ntp > cucm-115.home.lab.50141: NTPv4, Server, length 48
16:09:01.668612 IP cucm-115.home.lab.50141 > time1.example.com.ntp: NTPv4, Client, length 48
16:09:01.681366 IP time1.example.com.ntp > cucm-115.home.lab.50141: NTPv4, Server, length 48
16:09:01.681518 IP cucm-115.home.lab.50141 > time1.google.com.ntp: NTPv4, Client, length 48
16:09:01.694108 IP time1.google.com.ntp > cucm-115.home.lab.50141: NTPv4, Server, length 48
16:09:01.875016 IP cucm-115.home.lab.48422 > time1.google.com.ntp: NTPv4, Client, length 48
16:09:01.884476 IP cucm-sub3.home.lab.58072 > cucm-115.home.lab.ntp: NTPv4, Client, length 48
16:09:01.884568 IP cucm-115.home.lab.ntp > cucm-sub3.home.lab.58072: NTPv4, Server, length 48
```

```
16:09:01.884954 IP cucm-sub3.home.lab.58072 > cucm-115.home.lab.ntp: NTPv4, Client, length 48
16:09:01.884999 IP cucm-115.home.lab.ntp > cucm-sub3.home.lab.58072: NTPv4, Server, length 48
16:09:01.885381 IP cucm-sub3.home.lab.58072 > cucm-115.home.lab.ntp: NTPv4, Client, length 48
16:09:01.885423 IP cucm-115.home.lab.ntp > cucm-sub3.home.lab.58072: NTPv4, Server, length 48
16:09:01.886147 IP cucm-sub3.home.lab.58072 > cucm-115.home.lab.ntp: NTPv4, Client, length 48
16:09:01.886184 IP cucm-115.home.lab.ntp > cucm-sub3.home.lab.58072: NTPv4, Server, length 48
16:09:01.888555 IP time1.google.com.ntp > cucm-115.home.lab.48422: NTPv4, Server, length 48
16:09:01.888642 IP cucm-115.home.lab.48422 > time1.google.com.ntp: NTPv4, Client, length 48
16:09:01.900926 IP time1.google.com.ntp > cucm-115.home.lab.48422: NTPv4, Server, length 48
16:09:01.901017 IP cucm-115.home.lab.48422 > time1.google.com.ntp: NTPv4, Client, length 48
16:09:01.913497 IP time1.google.com.ntp > cucm-115.home.lab.48422: NTPv4, Server, length 48
16:09:01.913566 IP cucm-115.home.lab.48422 > time1.google.com.ntp: NTPv4, Client, length 48
16:09:01.926693 IP time1.google.com.ntp > cucm-115.home.lab.48422: NTPv4, Server, length 48
16:09:02.038981 IP cucm-sub2.home.lab.42078 > cucm-115.home.lab.ntp: NTPv4, Client, length 48
16:09:02.039117 IP cucm-115.home.lab.ntp > cucm-sub2.home.lab.42078: NTPv4, Server, length 48
16:09:02.039281 IP cucm-sub2.home.lab.42078 > cucm-115.home.lab.ntp: NTPv4, Client, length 48
16:09:02.039345 IP cucm-115.home.lab.ntp > cucm-sub2.home.lab.42078: NTPv4, Server, length 48
16:09:02.039434 IP cucm-sub2.home.lab.42078 > cucm-115.home.lab.ntp: NTPv4, Client, length 48
16:09:02.039535 IP cucm-115.home.lab.ntp > cucm-sub2.home.lab.42078: NTPv4, Server, length 48
16:09:02.039607 IP cucm-sub2.home.lab.42078 > cucm-115.home.lab.ntp: NTPv4, Client, length 48
16:09:02.039814 IP cucm-115.home.lab.ntp > cucm-sub2.home.lab.42078: NTPv4, Server, length 48
16:09:02.066544 IP cucm-sub1.home.lab.46400 > cucm-115.home.lab.ntp: NTPv4, Client, length 48
16:09:02.066622 IP cucm-115.home.lab.ntp > cucm-sub1.home.lab.46400: NTPv4, Server, length 48
16:09:02.066751 IP cucm-sub1.home.lab.46400 > cucm-115.home.lab.ntp: NTPv4, Client, length 48
16:09:02.066892 IP cucm-115.home.lab.ntp > cucm-sub1.home.lab.46400: NTPv4, Server, length 48
16:09:02.066968 IP cucm-sub1.home.lab.46400 > cucm-115.home.lab.ntp: NTPv4, Client, length 48
16:09:02.067104 IP cucm-115.home.lab.ntp > cucm-sub1.home.lab.46400: NTPv4, Server, length 48
16:09:02.067155 IP cucm-sub1.home.lab.46400 > cucm-115.home.lab.ntp: NTPv4, Client, length 48
16:09:02.067189 IP cucm-115.home.lab.ntp > cucm-sub1.home.lab.46400: NTPv4, Server, length 48
```

CUCM的PCAP审核 — 包含文件

用于解决数据包捕获中的NTP问题的过滤器为：**udp.port == 123**。通过此过滤器，您可以看到CUCM发布者与Google NTP服务器建立了通信，并且CUCM发布者也与CUCM用户进行了通信。

ntp_restart.cap

File Edit View Go Capture Analyze Statistics Telephony Wireless Tools Help

udp.port == 123

No.	Time	Source	Destination	Protocol	Info
14...	16:08:01.559665	192.	216.	NTP	NTP Version 4, client
14...	16:08:01.571555	216.	192.	NTP	NTP Version 4, server
15...	16:08:02.184443	192.	192.	NTP	NTP Version 4, client
15...	16:08:02.184623	192.	192.	NTP	NTP Version 4, server
15...	16:08:02.185545	192.	192.	NTP	NTP Version 4, client
15...	16:08:02.185571	192.	192.	NTP	NTP Version 4, server
15...	16:08:02.186535	192.	192.	NTP	NTP Version 4, client
15...	16:08:02.186557	192.	192.	NTP	NTP Version 4, server
15...	16:08:02.187475	192.	192.	NTP	NTP Version 4, client
15...	16:08:02.187494	192.	192.	NTP	NTP Version 4, server
15...	16:08:02.260265	192.	192.	NTP	NTP Version 4, client
15...	16:08:02.260358	192.	192.	NTP	NTP Version 4, server
15...	16:08:02.260644	192.	192.	NTP	NTP Version 4, client
15...	16:08:02.260685	192.	192.	NTP	NTP Version 4, server
15...	16:08:02.260826	192.	192.	NTP	NTP Version 4, client
15...	16:08:02.260863	192.	192.	NTP	NTP Version 4, server
15...	16:08:02.260969	192.	192.	NTP	NTP Version 4, client
15...	16:08:02.261003	192.	192.	NTP	NTP Version 4, server
15...	16:08:02.284288	192.	216.	NTP	NTP Version 4, client
15...	16:08:02.638610	192.	192.	NTP	NTP Version 4, client
15...	16:08:02.638725	192.	192.	NTP	NTP Version 4, server
15...	16:08:02.638989	192.	192.	NTP	NTP Version 4, client
15...	16:08:02.639030	192.	192.	NTP	NTP Version 4, server
16...	16:08:02.639182	192.	192.	NTP	NTP Version 4, client
16...	16:08:02.639220	192.	192.	NTP	NTP Version 4, server

CUCM的CLI输出回顾

utils ntp status输出

NOTE: All nodes will show the current time in UTC regardless of the time zone of the server (listed in UTC time). This makes it easy to compare times on the different CUCM nodes.

NOTE: If there is a time difference of 15 minutes or more, it is expected that DB replication will be broken

1) If the publisher is ahead by 15 minutes, this can result in the pub send data to the sub and the sub would have a delay to process the data because it has not yet reached the time in the timestamp of the packets from the publisher (this is expected behavior in this type of situation)

2) If the subscriber is ahead by 15 minutes, this would result in the subscriber drop the data from the publisher because the subscriber sees it as old data (15 minutes old)

admin:utils ntp status

ntpd (pid 28435) is running...

```

remote      refid      st t when poll reach  delay  offset  jitter
=====
203.0.113.0 .GOOG.    1 u  44  64   3  11.724 -0.021  0.064

```

unsynchronised

polling server every 8 s

Current time in UTC is : Fri Sep 6 20:54:50 UTC 2019

Current time in America/New_York is : Fri Sep 6 16:54:50 EDT 2019

admin:

阅读下一信息，如前一个输出详解。

The very first column contains the "**tally code**" character. Short overview:

- * the source you are synchronized to (syspeer)
- # source selected, distance exceeds maximum value
 - o the PPS(Pulse Per Second) source if your ntpd (ppspeer, only if you have a PPS capable system and refclock)
- + candidate, i.e. it is considered a good source
- outlyer, i.e. quality is not good enough
- x falseticker, i.e. this one is considered to distribute bad time
- blank: source discarded, failed sanity

See the Select field of the Peer status word on the NTP Event Messages and Status Words page for more information on the tally codes. **remote**

the hostname or IP of the remote machine. **refid**

the identification of the time source to which the remote machines is synced.

May be (for example) a radio clock or another ntp server) **st**

the stratum of the remote machine. 16 is "unsynchronized". 0 is the best

value, that could be (for example) a radio clock or the ntp servers private caesium clock (see <http://www.eecis.udel.edu/~mills/ntp/html/index.html#intro> for more information about ntp in general). **t**

types available: l = local (such as a GPS, WWVB) u = unicast (most common) m = multicast b = broadcast - = netaddr **when**

how many seconds since the last poll of the remote machine. **poll**

the polling interval in seconds. **reach**

an 8-bit left-rotating register. Any 1 bit means that a "time packet" was

received. The right most bit indicate the status of the last connection

with the NTP server. It is Octal number. Use calculator in progammer

interface to translate from OCT to BIN: For example 377 translates to

11111111. Each 1 means a successful connection to the NTP server. If you

just start a NTP service, and it connects successfully with its server, this

number will change as follows (if connectivity is good): 00000001 = 001 00000011 = 003 00000111

= 007 00001111 = 017 00011111 = 037 00111111 = 077 01111111 = 177 11111111 = 377 **delay**

the time delay (in milliseconds) to communicate with the remote. **offset**

the offset (in milliseconds) between our time and that of the remote. **jitter**

the observed jitter (in milliseconds) of time with the remote.

Utils诊断测试输出

admin:utils diagnose test

Log file: platform/log/diag1.log

Starting diagnostic test(s)

=====

test - disk_space : Passed (available: 6463 MB, used: 12681 MB)

skip - disk_files : This module must be run directly and off hours


```
test - service_manager      : Passed
test - tomcat                : Passed
test - tomcat_deadlocks     : Passed
test - tomcat_keystore      : Passed
test - tomcat_connectors    : Passed
test - tomcat_threads       : Passed
test - tomcat_memory        : Passed
test - tomcat_sessions      : Passed
skip - tomcat_heapdump      : This module must be run directly and off hours
test - validate_network     : Passed
test - raid                  : Passed
test - system_info          : Passed (Collected system information in diagnostic log)
test - ntp_reachability     : Passed
test - ntp_clock_drift      : Passed
test - ntp_stratum          : Passed
skip - sdl_fragmentation    : This module must be run directly and off hours
skip - sdi_fragmentation    : This module must be run directly and off hours
```

Diagnostics Completed

The final output will be in Log file: platform/log/diag1.log

Please use 'file view activelog platform/log/diag1.log' command to see the output

admin:

如果utils diagnose test输出中的NTP失败，您会看到类似下面的内容：

```
admin:utils diagnose test
```

```
Log file: platform/log/diag1.log
```

```
Starting diagnostic test(s)
```

```
=====
```

```
test - disk_space          : Passed (available: 6463 MB, used: 12681 MB)
skip - disk_files          : This module must be run directly and off hours
test - service_manager     : Passed
test - tomcat              : Passed
test - tomcat_deadlocks    : Passed
test - tomcat_keystore     : Passed
test - tomcat_connectors   : Passed
test - tomcat_threads      : Passed
test - tomcat_memory       : Passed
test - tomcat_sessions     : Passed
skip - tomcat_heapdump     : This module must be run directly and off hours
test - validate_network    : Passed
test - raid                : Passed
test - system_info        : Passed (Collected system information in diagnostic log)
```

```
test - ntp_reachability   : Warning
```

```
The NTP service is restarting, it can take about 5 minutes.
```

```
test - ntp_clock_drift   : Warning
```

```
The local clock is not synchronised.
```

```
None of the designated NTP servers are reachable/functioning or legitimate.
```

```
test - ntp_stratum       : Warning
```

```
The local clock is not synchronised.
```

```
None of the designated NTP servers are reachable/functioning or legitimate.
```

```
skip - sdl_fragmentation  : This module must be run directly and off hours
```

确认安装时NTP是否正常。运行以下命令：

从cdftime > getCurrTime()的设备运行sql select pkid , name , dbinfo('utc_to_datetime', cdftime)作为CDRTIME

此命令将当前时间与cdftime (修改表时) 进行比较。如果在安装/升级过程中使用了错误的NTP，然后更正了NTP，则每次进行更改时，数据库都会不同步。当您运行典型的NTP命令(例如，`utils ntp status`)时，不会出现此问题，因为您已从错误的NTP源移动到好的NTP源。

从错误的NTP移至好的NTP是件好事；但是，移至好的NTP源不会修复安装/升级时创建的表。

运行此命令时，预期输出如下：

```
admin:run sql select pkid,name,dbinfo('utc_to_datetime', cdftime) as CDRTIME from device where cdftime > getCurrTime()
```

```
pkid name cdftime
```

```
==== =====
```

```
admin:
```

如果您有与下一个类似的输出，则表明用于安装/升级的NTP尚未使用，并且已导致影响数据库复制的问题：

```
admin:run sql select pkid,name,dbinfo('utc_to_datetime', cdftime) as CDRTIME from device where cdftime > getCurrTime()
```

pkid	name	cdftime
bf80dd31-9911-43ce-81fd-a99ec0333fb5	MTP_2	2016-09-11 14:38:14.0
4c38fc05-760d-4afb-96e8-69333c195e74	CFB_2	2016-09-11 14:38:14.0
90878c80-e213-4c7e-82b9-6c780aac72f3	ANN_2	2016-09-11 14:38:14.0
08b5bff4-da94-4dfb-88af-ea9ffa96872c	MOH_2	2016-09-11 14:38:14.0
93320e4d-1b73-4099-9a7c-c4cddfadb5d9	MTP_3	2016-09-11 14:38:14.0
a6850d42-5f0a-49ce-9fa3-80d45b800e23	CFB_3	2016-09-11 14:38:14.0
9963c9cb-58b0-4191-93e1-8676584f6461	ANN_3	2016-09-11 14:38:14.0
def79fb7-c801-4fb3-85fb-4e94310bf0bd	MOH_3	2016-09-11 14:38:14.0
4cd64584-089b-4331-9291-79774330cbc	2 MTP_4	2016-09-11 14:38:14.0
27b18882-db83-4d14-8bce-d3f8dc439610	CFB_4	2016-09-11 14:38:14.0
a40da882-e04f-4649-b2eb-2f79d1289e81	ANN_4	2016-09-11 14:38:14.0
36575ff4-cdea-4945-87e7-638cc555463e	MOH_4	2016-09-11 14:38:14.0

进一步注意事项

1)如果升级ESXi主机时未考虑虚拟机硬件因素，可能会遇到NTP问题。

2)确保ESXi版本符合虚拟化[矩阵](#)。

3)确保ESXi版本和硬件版本兼容

相关信息

- [技术支持和文档 — Cisco systems](#)

- [思科协作系统10.x解决方案参考网络设计\(SRND\)](#)
- [从CLI和其他有用信息更改CUCM中的NTP源](#)
- [Cisco Unified Communications Manager上的NTP故障排除](#)
- [网络时间协议：最佳实践白皮书](#)
- [CUCM 设备型号上的数据包捕获](#)

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