

# CUE JTAPI问题和案例研究

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## 简介

本文档提供有关如何排除Cisco Unity Express(CUE)Java电话应用编程接口(JTAPI)故障的信息。此外，本文档还提供了有关如何启用、收集和查看不同跟踪和日志的信息和命令以及故障排除案例研究示例。

## 先决条件

### 要求

Cisco 建议您了解以下主题：

- 有关如何通过网络管理界面配置和使用思科统一通信管理器(CUCM)的基本知识。
- 基本熟悉CUCM中的计算机电话接口(CTI)端口和路由点(RP)。
- 基本熟悉Cisco Unity Express命令行界面。

### 使用的组件

本文档中的信息基于以下软件和硬件版本：

- Cisco Unity Express版本3.x或更高版本。
- Cisco Unified Communications Manager 7.x版或更高版本。

使用的集成方法仅适用于Cisco Unity Express与Cisco Unified Communications Manager;而不是使用Cisco Unified Communications Manager Express(CUCME)。

Cisco Unity Express必须获得CUCM的许可，而不是CUCME。CUE可以随时与CUCM或CUCME集成，并相应地获得许可。

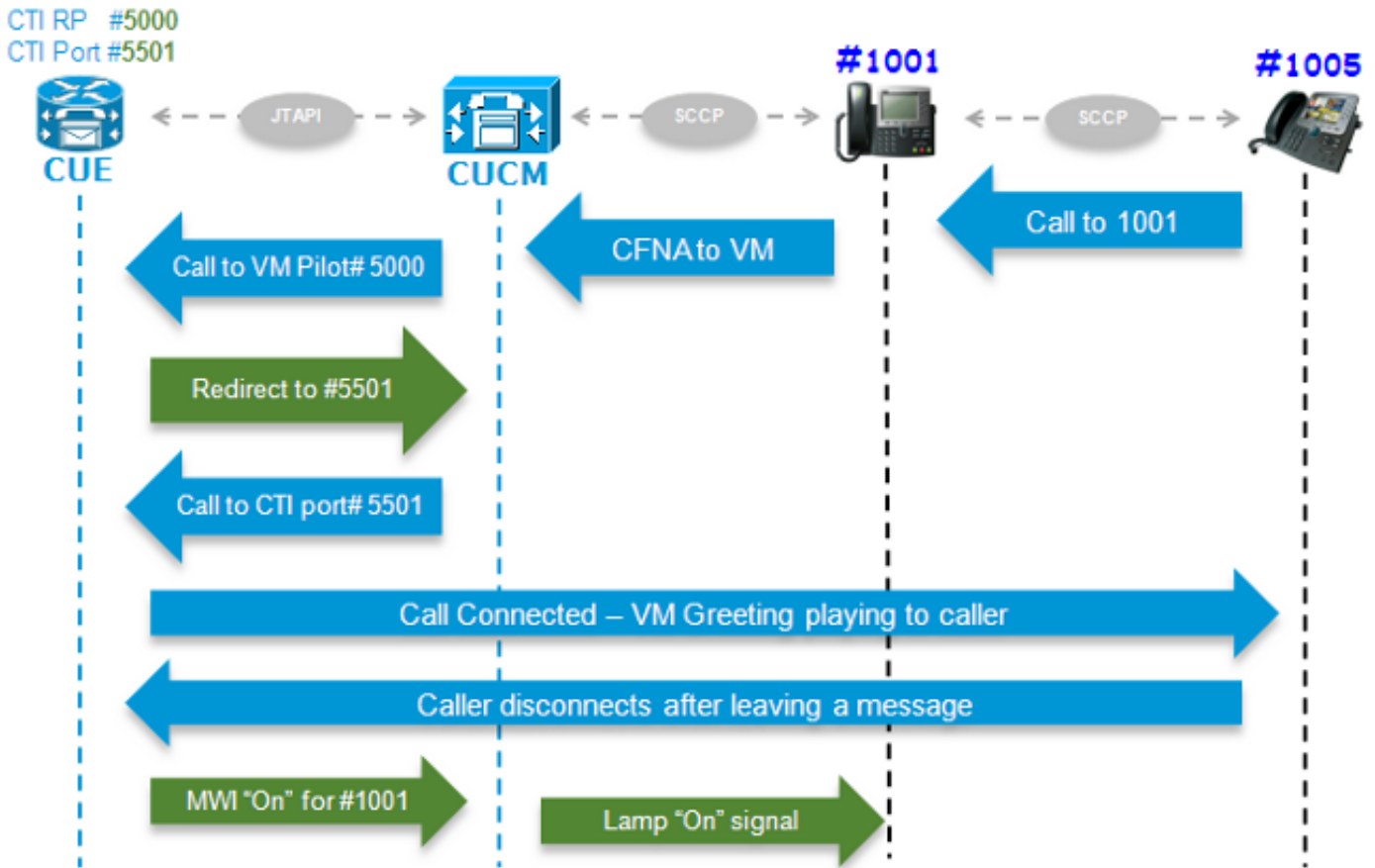
本文档中的信息都是基于特定实验室环境中的设备编写的。本文档中使用的所有设备最初均采用原始（默认）配置。如果您使用的是真实网络，请确保您已经了解所有命令的潜在影响。

## CUE JTAPI与CUCM集成概述

通过语音邮件(TM)和自动总机(AA)功能的JTAPI协议，CUE与CUCM可以集成。当您希望为注册到CUCM服务器的用户数量较少的一个或多个分支机构站点调配TM功能和/或基本AA呼叫处理时，建议使用此解决方案。这不需要功能齐全的Cisco Unity语音邮件服务器，而是需要更经济实惠的实施。同时，CUE还为其分支机构提供生存性选项，并在与CUCM的连接丢失时故障切换到会话发起协议(SIP)。

CUE可以通过JTAPI向CUCM注册并控制CTI路由点和CTI端口。这允许您通过CUCM控制和管理CUE作为附加终端，并促进配置以及与集群中其他终端的交互。

### 高级呼叫流示例



目录号码(DN)为1005的最终用户呼叫DN为1001的用户。如果呼叫未应答（呼叫转移无应答 [CFNA]），则呼叫在几秒钟后转接到用户1001 VM配置文件上配置的VM号码。然后，CUCM将呼叫发送到已配置的VM Pilot 5000，该VM Pilot 5000指向DN为5000且由CUE控制的CTI RP。CUE VM应用被触发，呼叫通过JTAPI重定向到可用CTI端口(DN 5501)以建立媒体。音频问候语将播放，用户可以留言或通过双音多频(DTMF)音与系统交互。当呼叫方结束呼叫时，CUE通过JTAPI向CUCM发出信号，将分机1001的消息等待指示器(MWI)灯设置为“On”。然后，CUCM发送瘦客户端控制协议(SCCP)消息以打开电话上的灯，并在显示屏上显示信封指示，以使用户1001知道邮箱中有新的VM消息。

## 支持和收集跟踪

有两种类型的跟踪：

- 实时JTAPI思科通信网络(CCN)跟踪
- JTAPI CCN跟踪日志

### 实时JTAPI CCN跟踪

- 实时JTAPI CCN跟踪。（启用这些跟踪不需要重新加载CUE模块。）
- 输出不如CCN跟踪日志的内容广泛，但也不能提供很多信息。

输入以下命令以启用跟踪：

```
no trace all
trace ccn SubsystemJtapi all
```

输入以下命令以验证它们是否已启用：

```
CUE# show trace
MODULE ENTITY SETTING
ccn SubsystemJtapi ffffffff
```

输入以下命令以收集输出：

```
CUE# show trace buffer ?
containing Only display events matching a regex pattern
long Show long format
short Show short format
tail Wait for events and print them as they occur !!
```

输入CTRL-C以停止实时记录到控制台。

## JTAPI CCN跟踪日志

启用JTAPI CCN跟踪日志后，需要重新加载CUE模块，以便填充日志。这些日志、**messages.log**和**atrace.log**，可以非常详细或神秘，而且信息更丰富、更详细。有四种不同的日志：

- **atrace.log**

默认在网络模块(NM)上启用，但默认为对高级集成模块(AIM)禁用。输入**log trace local enable**命令以启用该命令。它在本地或FTP服务器上写入最多10 Mb。要重新启动日志，请输入**log trace local disable**命令或**no log trace local enable**命令；然后输入**log trace local enable**命令。输入**clear trace file**命令以清除**atrace.log**。数据必须由技术支持中心(TAC)解码。

- **messages.log**

这些日志包含系统日志消息，如Info、Warning、Error和Fatal。

- **CiscoJtapi1.log**和**CiscoJtapi2.log**

它们记录所有与JTAPI相关的信令和事件。这些日志更易于理解，信息量也更大。当CiscoJtapi1.log变满时，CiscoJtapi2.log开始填充，反之亦然。

无论设置了哪些跟踪，系统都会在重新加载后恢复到默认跟踪级别。要更改这些默认设置以使其在重新启动后继续运行，必须输入**log trace boot**命令。以下是用于启用它们的命令：

```
CUE#(CONFIG)> log console info !!
ccn trace jtapi deb all
ccn trace jtapi info all
ccn trace jtapi warn all
log trace boot
reload
```

输入以下命令以验证它们是否已启用：

```
CUE# show ccn trace jtapi
Warning: 1
Informational: 1
Jtapi Debugging: 1
Jtapi Implementation: 1
CTI Debugging: 1
CTI Implementation: 1
Protocol Debugging: 1
Misc Debugging: 1
```

查看日志的步骤如下：

1. 输入**show logs**命令以查看CUE中存储的日志文件列表。

2. .prev文件扩展名表示这是旧跟踪文件的备份，而不是当前活动日志文件的备份。
3. 您可以将其解压到外部FTP服务器。
4. 您还可以从CUE的终端监视器查看实时记录到这些文件的消息的输出。

## 收集跟踪日志文件

使用以下命令将日志提取到外部FTP:

```
copy log CiscoJtapi2.log url ftp://username:password@192.168.105.1/  
copy log CiscoJtapi1.log url ftp://username:password@192.168.105.1/  
copy log messages.log url ftp://username:password@192.168.105.1/  
copy log atrace.log url ftp://username:password@192.168.105.1/
```

使用show log name <logname>命令将日志显示到CUE终端监视器中。示例如下：

```
CUE# show log name messages.log ?  
containing Only display events matching a regex pattern  
paged Display in page mode  
tail Wait for events and print them as they occur  
<cr>
```

atrace.log被编码；因此，您不能仅使用show log name命令实时显示它。

## 检查日志之前必须具有详细信息

您必须至少从您正在排除的问题的呼叫中获取此处概述的所有详细信息，以便您能够轻松跟踪和了解跟踪：

- 主叫号码
- 被叫号码
- 重定向编号
- CTI RP DN和设备名称
- CTI端口号和设备名称
- JTAPI用户
- 发生呼叫的时间范围

## 基本CTI概念

**提供商：**CTI服务的提供商。应用通过打开提供商来建立CTI会话。

**用户名：**应用程序与用户关联。

**设备：**注册到CUCM的设备。

**行：**CTI支持的设备上的DN外观。

**呼叫ID(callLegID)：**与呼叫中的一个呼叫段关联。

**全局呼叫(callID)：**标识单个呼叫的所有呼叫段。

## 常见CTI呼叫状态

```
state = 1 IDLE  
state = 2 OFFERING  
state = 3 ACCEPTED  
state = 8 CONNECTED
```

# 跟踪日志应显示什么

在您发现错误信令之前，您首先需要了解正常操作下此信令的外观；因此，本部分显示信号输出的片段，这些信号输出在正常工作时在不同场景中会显示。

另请注意，这些日志中的所有信令已汇总为仅显示相关详细信息，因为它们包含非常详细的信息，非常繁琐且重复。

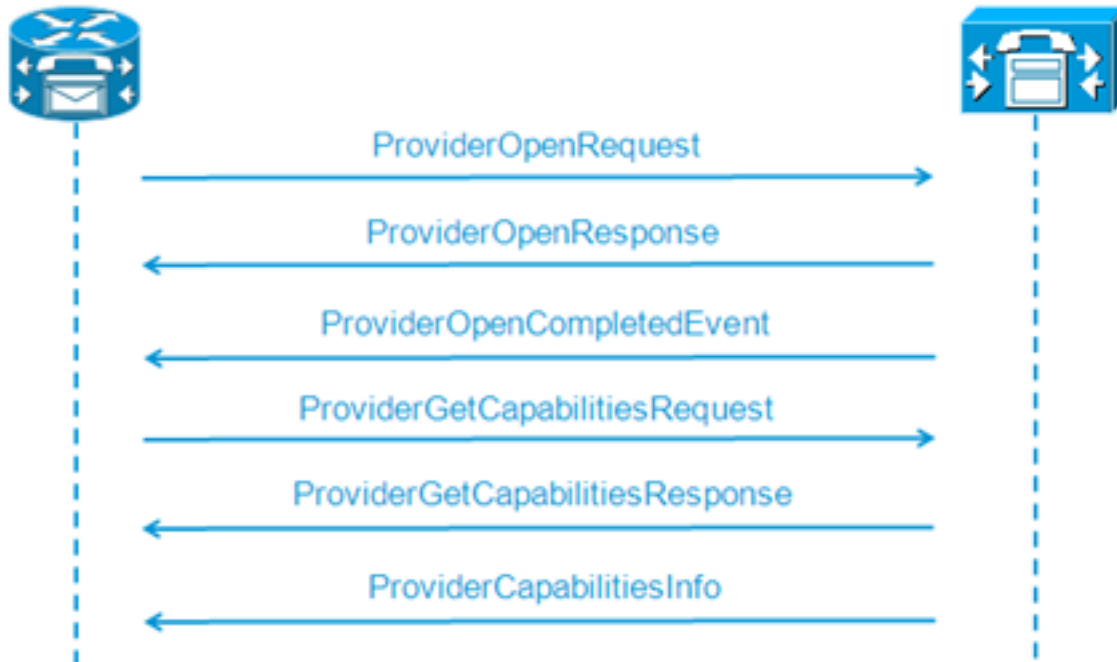
以下是所用配置的信息：

```
Jtapi User: tacjtapiuser
CUCM IP Address: 192.168.100.10
CUE CTI Route Point: cue_vm_ctirp
CUE CTI Port: cue_ctiport1
CUE and Phone Partition: cue_pt
IP Phone MAC: SEP0023331C29EC
CTI Route Point DN: 8000
CTI Port DN: 8501
IP Phone DN: 3001
```

## CTI RP和端口注册

( CiscoJtapi1/Cisco Jtapi2日志的输出 )

### 1. 打开提供程序连接



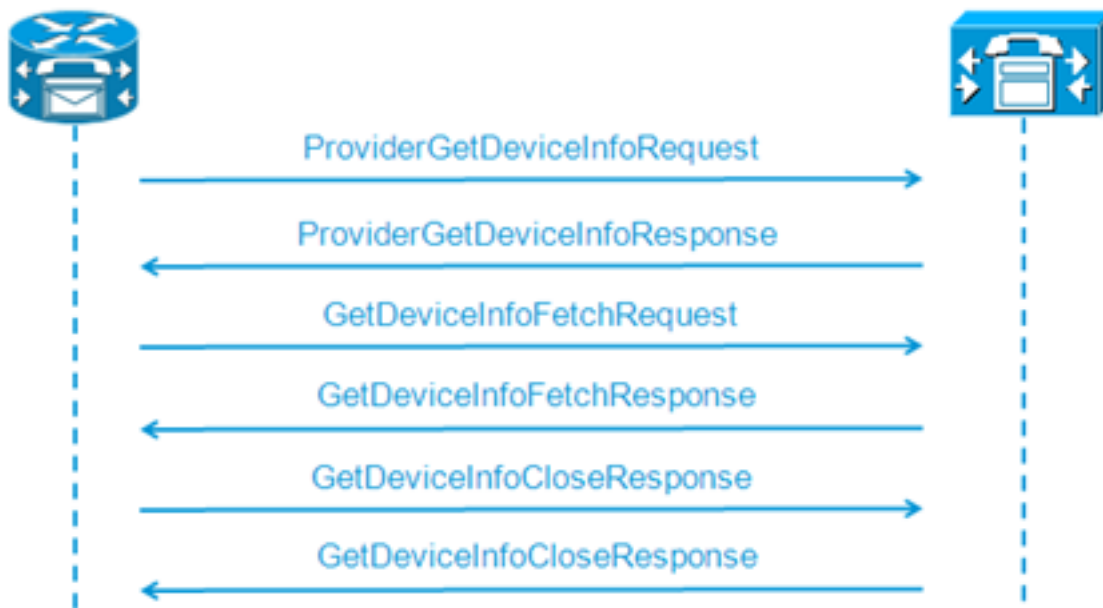
```
21: 12:05:23.686 CST %JTAPI-CTIIMPL-7-UNK.(P1-tacjtapiuser) ProviderID =
P1-tacjtapiuser
22: 12:05:23.739 CST %JTAPI-CTIIMPL-7-UNK.(P1-tacjtapiuser) Trying to
create normal socket connection to 192.168.100.10
23: 12:05:23.747 CST %JTAPI-CTIIMPL-7-UNK.(P1-tacjtapiuser) connected
26: 12:05:24.112 CST %JTAPI-PROTOCOL-7-UNK.(P1-192.168.100.10) [SS_TEL_INIT]
sending: com.cisco.cti.protocol.ProviderOpenRequest {
provider = 192.168.100.10
qbeClientVersion = Cisco JTAPI 7.0(1.1000)-1 Release
```

```

login = com.cisco.cti.protocol.UnicodeString {
unicodedisplayName = tacjtapiuser
}
applicationID = Cisco IP IVR
desiredServerHeartbeatTime = 30
pluginName = CiscoJTAPI
}
28: 12:05:24.131 CST %JTAPI-PROTOCOL-7-UNK. (P1-192.168.100.10) received
Response: com.cisco.cti.protocol.ProviderOpenResponse {
sequenceNumber = 0
result = 0
providerInfoString = 7.1.5.10000-12
clientHeartbeat = 30
serverHeartbeat = 30
pluginVersion = 7.1.5.10000-2
pluginLocation = http://192.168.100.10/plugins/
providerId = 16777236
}
35: 12:05:24.858 CST %JTAPI-PROTOCOL-7-UNK. (P1-192.168.100.10) received
Event: com.cisco.cti.protocol.ProviderOpenCompletedEvent {
eventSequence = 0
reason = 0
providerInfoString = 7.1.5.10000-12
clientHeartbeat = 30
serverHeartbeat = 30
failureDescription = null
providerId = 16777236
}

```

## 2. 可控设备查询



```

48: 12:05:24.864 CST %JTAPI-PROTOCOL-7-UNK. (P1-192.168.100.10) [SS_TEL_INIT]
sending: com.cisco.cti.protocol.ProviderGetDeviceInfoRequest {
sequenceNumber = 2
deviceGroup = 1
}
49: 12:05:24.865 CST %JTAPI-PROTOCOL-7-UNK. (P1-192.168.100.10) received
Response: com.cisco.cti.protocol.ProviderGetDeviceInfoResponse {
sequenceNumber = 2
result = 0
}
50: 12:05:24.865 CST %JTAPI-PROTOCOL-7-UNK. (P1-192.168.100.10) [SS_TEL_INIT]
sending: com.cisco.cti.protocol.GetDeviceInfoFetchRequest {

```

```

sequenceNumber = 3
}
51: 12:05:25.011 CST %JTAPI-PROTOCOL-7-UNK. (P1-192.168.100.10) received
Response: com.cisco.cti.protocol.GetDeviceInfoFetchResponse {
sequenceNumber = 3
result = 0
info = 2@[
com.cisco.cti.protocol.DeviceInfo {
name           = cue_ctiport1
type = 72
allowsRegistration = true
deviceID = 62
devTypeName = CTI Port
},
com.cisco.cti.protocol.DeviceInfo {
name           = cue_vm_ctirp
type = 73
allowsRegistration = true
deviceID = 61
devTypeName = CTI Route Point
}]
52: 12:05:25.012 CST %JTAPI-PROTOCOL-7-UNK. (P1-192.168.100.10) [SS_TEL_INIT]
sending: com.cisco.cti.protocol.GetDeviceInfoCloseRequest {
sequenceNumber = 4
}
53: 12:05:25.013 CST %JTAPI-PROTOCOL-7-UNK. (P1-192.168.100.10)
received Response: com.cisco.cti.protocol.GetDeviceInfoCloseResponse {
sequenceNumber = 4
}
54: 12:05:25.013 CST %JTAPI-MISC-7-UNK. (P1-192.168.100.10)

```

creating controlled devices

### 3. 获取CTI端口线路信息



```

55: 12:05:25.024 CST %JTAPI-PROTOCOL-7-UNK. (P1-192.168.100.10) [SS_TEL_INIT]
sending: com.cisco.cti.protocol.DeviceGetLineInfoRequest {
sequenceNumber = 5
deviceName = cue_ctiport1
}
56: 12:05:25.026 CST %JTAPI-PROTOCOL-7-UNK. (P1-192.168.100.10)
received Response: com.cisco.cti.protocol.DeviceGetLineInfoResponse {
sequenceNumber = 5

```



```

result = 0
}
57: 12:05:25.026 CST %JTAPI-PROTOCOL-7-UNK.(P1-192.168.100.10) [SS_TEL_INIT]
sending: com.cisco.cti.protocol.GetLineInfoFetchRequest {
sequenceNumber = 6
}
58: 12:05:25.029 CST %JTAPI-PROTOCOL-7-UNK.(P1-192.168.100.10)
received Response: com.cisco.cti.protocol.GetLineInfoFetchResponse {
sequenceNumber = 6
result = 0
com.cisco.cti.protocol.LineInfo {
name = 8501
displayName =
maxNumberOfCalls = 4
lineInstance = 1
unicodeDisplayName = com.cisco.cti.protocol.UnicodeString {
}
partition = cue_pt
defaultIntercomTargetInfo = com.cisco.cti.protocol.LineIntercomSpeedDialInfo {
}]
59: 12:05:25.029 CST %JTAPI-PROTOCOL-7-UNK.(P1-192.168.100.10) [SS_TEL_INIT]
sending: com.cisco.cti.protocol.GetLineInfoCloseRequest {
sequenceNumber = 7
}
60: 12:05:25.031 CST %JTAPI-PROTOCOL-7-UNK.(P1-192.168.100.10)
received Response: com.cisco.cti.protocol.GetLineInfoCloseResponse {
sequenceNumber = 7
result = 0
}
61: 12:05:25.042 CST %JTAPI-CTI-7-UNK.(P1-tacjtapiuser)
DeviceMap: adding device "cue_ctiport1"

```

#### 4. 获取CTI RP线路信息

```

62: 12:05:25.043 CST %JTAPI-PROTOCOL-7-UNK.(P1-192.168.100.10) [SS_TEL_INIT]
sending: com.cisco.cti.protocol.DeviceGetLineInfoRequest {
sequenceNumber = 8
deviceName = cue_vm_ctirp
}
63: 12:05:25.044 CST %JTAPI-PROTOCOL-7-UNK.(P1-192.168.100.10)
received Response: com.cisco.cti.protocol.DeviceGetLineInfoResponse {
sequenceNumber = 8
result = 0
}
64: 12:05:25.045 CST %JTAPI-PROTOCOL-7-UNK.(P1-192.168.100.10) [SS_TEL_INIT]
sending: com.cisco.cti.protocol.GetLineInfoFetchRequest {
sequenceNumber = 9
}
65: 12:05:25.047 CST %JTAPI-PROTOCOL-7-UNK.(P1-192.168.100.10)
received Response: com.cisco.cti.protocol.GetLineInfoFetchResponse {
sequenceNumber = 9
result = 0
info = 1@[
com.cisco.cti.protocol.LineInfo {
name = 8000
displayName =
permanentLineID = 52
partition = cue_pt
defaultIntercomTargetInfo = com.cisco.cti.protocol.LineIntercomSpeedDialInfo {
unicodeLabel = com.cisco.cti.protocol.UnicodeString {
}
}
}
66: 12:05:25.048 CST %JTAPI-PROTOCOL-7-UNK.(P1-192.168.100.10) [SS_TEL_INIT]
sending: com.cisco.cti.protocol.GetLineInfoCloseRequest {
sequenceNumber = 10
}

```

```
}
67: 12:05:25.058 CST %JTAPI-PROTOCOL-7-UNK.(P1-192.168.100.10)
received Response: com.cisco.cti.protocol.GetLineInfoCloseResponse {
sequenceNumber = 10
result = 0
}
68: 12:05:25.059 CST %JTAPI-CTI-7-UNK.(P1-tacjtapiuser)
DeviceMap: adding device "cue_vm_ctirp"
69: 12:05:25.059 CST %JTAPI-CTI-7-UNK.(P1-192.168.100.10)
refreshing device map: previous=0 current=2 created=2 removed=0
```

## 5. CUE应用已接收配置

```
76: 12:05:25.064 CST %JTAPI-MISC-7-UNK.Provider 192.168.100.10
open, beginning device
initialization
77: 12:05:25.071 CST %JTAPI-JTAPI-7-UNK.(P1-tacjtapiuser) [SS_TEL_INIT]
(P1-tacjtapiuser) Request: addObserver
79: 12:05:25.073 CST %JTAPI-MISC-7-UNK.ObserverThread
(com.cisco.wf.subsystems.jtapi.SubsystemJTAPI$ProviderObserver@3d823d82):created
80:12:05:25.074 CST %JTAPI-JTAPI-7-UNK.(P1-tacjtapiuser) ProvOutOfServiceEv [#0]
Cause:100 CallCtlCause:0 CiscoFeatureReason:12
82: 12:05:25.085 CST %JTAPI-MISC-7-
UNK.ObserverThread
(com.cisco.wf.subsystems.jtapi.SubsystemJTAPI$ProviderObserver@3d823d82):
queuing com.cisco.jtapi.JtapiProviderEventSet
83: 12:05:25.084 CST %JTAPI-MISC-7-UNK.(P1-192.168.100.10)
ProviderRetryThread starting up
85: 12:05:25.084 CST %JTAPI-MISC-7-UNK.ObserverThread
(com.cisco.wf.subsystems.jtapi.SubsystemJTAPI$ProviderObserver@3d823d82)
starting up...
90: 12:05:25.102 CST %JTAPI-JTAPIIMPL-7-UNK.Partition Support 8000 in
partitioncue_pt
91: 12:05:25.102 CST %JTAPI-JTAPIIMPL-7-UNK.(P1-tacjtapiuser) cue_vm_ctirp:
Address: 8000 in partitioncue_pt created
92: 12:05:25.102 CST %JTAPI-JTAPIIMPL-7-UNK.Partition Internal Address Added
8000 in Partition cue_pt
93: 12:05:25.102 CST %JTAPI-JTAPIIMPL-7-UNK.Partition Support 8501 in
partitioncue_pt
94: 12:05:25.103 CST %JTAPI-JTAPIIMPL-7-UNK.(P1-tacjtapiuser) cue_ctiport1:
Address: 8501 in partitioncue_pt created
95: 12:05:25.103 CST %JTAPI-JTAPIIMPL-7-UNK.Partition Internal Address Added
8501 in Partition cue_pt
96: 12:05:25.103 CST %JTAPI-MISC-7-UNK.Provider "(P1-tacjtapiuser)" changing
state to IN_SERVICE
97: 12:05:25.103 CST %JTAPI-JTAPI-7-UNK.(P1-tacjtapiuser) [Thread-76]
(P1-tacjtapiuser) Request: getObservers
98: 12:05:25.103 CST %JTAPI-JTAPI-7-UNK.(P1-tacjtapiuser) ProvInServiceEv [#1]
Cause:100 CallCtlCause:0 CiscoFeatureReason:12
100: 12:05:25.103 CST %JTAPI-MISC-7-UNK.ObserverThread
(com.cisco.wf.subsystems.jtapi.SubsystemJTAPI$ProviderObserver@3d823d82):
queuing com.cisco.jtapi.JtapiProviderEventSet
101: 12:05:25.103 CST %JTAPI-JTAPIIMPL-7-UNK.Provider 192.168.100.10
initialized 2 devices
104: 12:05:25.104 CST %JTAPI-JTAPIIMPL-7-UNK:
[com.cisco.wf.subsystems.jtapi.SubsystemJTAPI$ProviderObserver@3d823d82]
delivering to providerChangedEvent
106: 12:05:25.523 CST %JTAPI-JTAPI-7-UNK.(P1-tacjtapiuser) [SS_TEL_INIT]
(P1-tacjtapiuser) Request: getAddress( 8501 )Partition = cue_pt
107: 12:05:25.526 CST %JTAPI-JTAPI-7-UNK.(P1-tacjtapiuser) [SS_TEL_INIT]
[cue_ctiport1]Request: addObserver
(com.cisco.wf.subsystems.jtapi.TAPIPortGroup$Port$AddressCallObserver@5d085d08)
```

## 6. 获取对CTI设备和线路的控制



```

109: 12:05:25.528 CST %JTAPI-PROTOCOL-7-UNK.(P1-192.168.100.10) [SS_TEL_INIT]
sending:
com.cisco.cti.protocol.DeviceOpenRequest {
deviceName = cue_ctiport1
}
110: 12:05:25.533 CST %JTAPI-PROTOCOL-7-UNK.(P1-192.168.100.10)
received Response:
com.cisco.cti.protocol.DeviceOpenResponse {
result = 0
}
111: 12:05:25.533 CST %JTAPI-CTI-7-UNK.(P1-tacjtapiuser) DeviceMap: opening
device "cue_ctiport1"
112: 12:05:25.533 CST %JTAPI-JTAPIIMPL-7-UNK.(P1-tacjtapiuser) Terminal
"cue_ctiport1" out of service
113: 12:05:25.534 CST %JTAPI-JTAPI-7-UNK.(P1-tacjtapiuser) [cue_ctiport1]
CiscoTermOutOfServiceEv [#2] Cause:100 CallCtlCause:0 CiscoFeatureReason:12
119: 12:05:25.544 CST %JTAPI-JTAPIIMPL-7-UNK:Address [cue_ctiport1:8501:
cue_pt.(0,0)] out of service
120: 12:05:25.544 CST %JTAPI-JTAPI-7-UNK.(P1-tacjtapiuser) [8501:cue_pt]
CiscoAddrOutOfServiceEv [#3] Cause:100 CallCtlCause:0 CiscoFeatureReason:12
121: 12:05:25.546 CST %JTAPI-PROTOCOL-7-UNK.(P1-192.168.100.10) [SS_TEL_INIT]
sending: com.cisco.cti.protocol.LineOpenRequest {
deviceName = cue_ctiport1
lineName = 8501
}
122: 12:05:25.582 CST %JTAPI-PROTOCOL-7-UNK.(P1-192.168.100.10) received
Response: com.cisco.cti.protocol.LineOpenResponse {
134: 12:05:25.670 CST %JTAPI-PROTOCOL-7-UNK.(P1-192.168.100.10) [SS_TEL_INIT]
sending: com.cisco.cti.protocol.LineCloseRequest {
135: 12:05:25.673 CST %JTAPI-PROTOCOL-7-UNK.(P1-192.168.100.10) received
Response: com.cisco.cti.protocol.LineCloseResponse {
138: 12:05:25.674 CST %JTAPI-PROTOCOL-7-UNK.(P1-192.168.100.10) [SS_TEL_INIT]
  
```

```

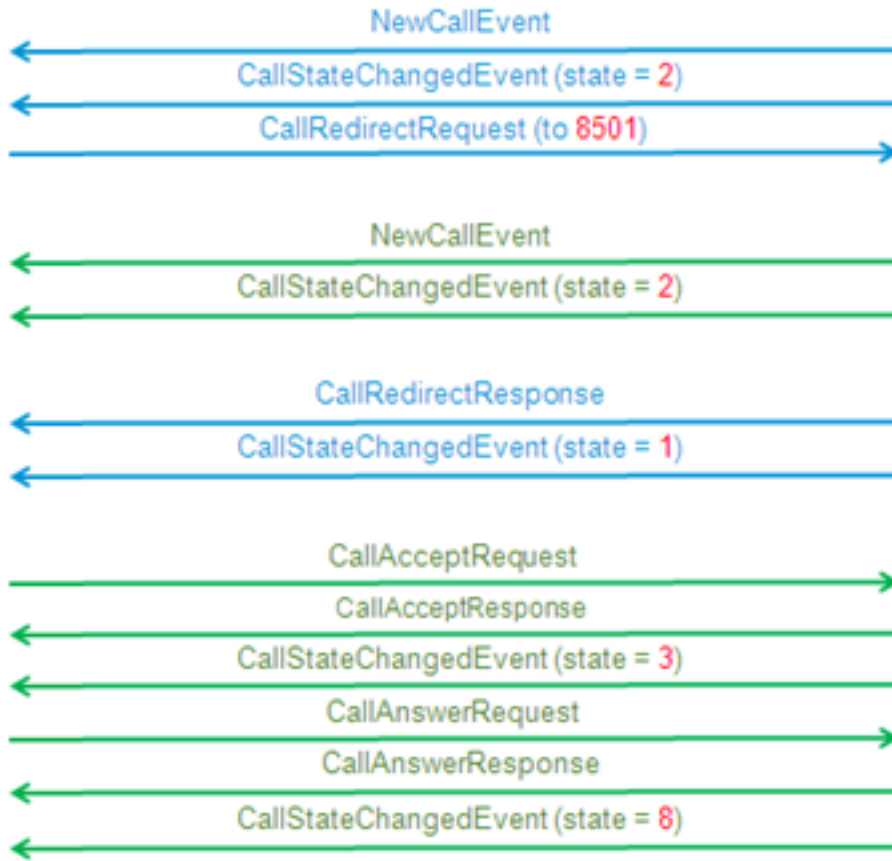
sending: com.cisco.cti.protocol.DeviceCloseRequest {
139: 12:05:25.681 CST %JTAPI-PROTOCOL-7-UNK.(P1-192.168.100.10) received
Response: com.cisco.cti.protocol.DeviceCloseResponse {
141: 12:05:25.683 CST %JTAPI-PROTOCOL-7-UNK.(P1-192.168.100.10) [SS_TEL_INIT]
sending: com.cisco.cti.protocol.DeviceRegisterDeviceRequest {
deviceName = cue_ctiport1
142: 12:05:25.687 CST %JTAPI-PROTOCOL-7-UNK.(P1-192.168.100.10) received
Response: com.cisco.cti.protocol.DeviceRegisterDeviceResponse {
result = 0
name = cue_ctiport1
allowsRegistration = true
}
143: 12:05:25.687 CST %JTAPI-CTI-7-UNK.(P1-tacjtapiuser) DeviceMap: opening
device "cue_ctiport1"
150: 12:05:25.688 CST %JTAPI-PROTOCOL-7-UNK.(P1-192.168.100.10) [SS_TEL_INIT]
sending: com.cisco.cti.protocol.LineOpenRequest {
deviceName = cue_ctiport1
lineName = 8501
151: 12:05:25.690 CST %JTAPI-PROTOCOL-7-UNK.(P1-192.168.100.10) received
Response: com.cisco.cti.protocol.LineOpenResponse {
152: 12:05:25.691 CST %JTAPI-JTAPIIMPL-7-UNK:cue_ctiport1: Lines opened
153: 12:05:25.739 CST %JTAPI-PROTOCOL-7-UNK.(P1-192.168.100.10) received
Event: com.cisco.cti.protocol.DeviceRegisteredEvent {
deviceInfo = com.cisco.cti.protocol.DeviceInfo {
allowsRegistration = true
controllable = true
}
156: 12:05:25.739 CST %JTAPI-PROTOCOL-7-UNK.(P1-192.168.100.10) Received
DeviceRegisteredEvent
160: 12:05:25.740 CST %JTAPI-PROTOCOL-7-UNK.(P1-192.168.100.10) received
Event: com.cisco.cti.protocol.DeviceInServiceEvent {
162: 12:05:25.741 CST %JTAPI-PROTOCOL-7-UNK.(P1-192.168.100.10) received
Event: com.cisco.cti.protocol.LineInServiceEvent {
}

```

## 将基本呼叫转接到语音邮件

( CiscoJtapi1/Cisco Jtapi2 日志的输出 )

## 新呼叫和重定向到可用端口



## 新呼叫和重定向到可用端口

```

12:46:00.396 CST %JTAPI-PROTOCOL-7-UNK.(P1-192.168.100.10) received Event:
com.cisco.cti.protocol.NewCallEvent {
deviceName                = cue_vm_ctirp
callLegID = 25626132
callID = 9040
callingParty = 3001
calledParty = 8000
callingPartyName = Ext 3001 - Phone
callingPartyDeviceName = SEP0023331C29EC
unModifiedCalledParty = 8000
unModifiedOriginalCalledParty = 8000
unModifiedLastRedirectingParty =
}
12:46:00.400 CST %JTAPI-PROTOCOL-7-UNK.(P1-192.168.100.10) received Event:
com.cisco.cti.protocol.CallStateChangedEvent {
callLegID = 25626132
state = 2
reason = 1
}
12:46:00.402 CST %JTAPI-CTI-7-UNK.(P1-tacjtapiuser){Line:cue_vm_ctirp:8000:
cue_pt.(1,28)
|Call:[GCID=
(9040/1),CID=25626132]} NewCall [ state=OFFERING auxData=1 destCM=1 destType=
IN_CLUSTER unModifiedCg=3001
unModifiedCd=8000 unModifiedOriginalCd=8000 unModifiedLastRedirected= calling=3001
callingName=Ext 3001 -
Phone called=8000 calledName= origParty=8000 origName=lastRedirected=
lastRedirectedName= origin=INBOUNDINTERNAL reason=DIRECTCALL activeTone=0
  
```

```
deviceName=cue_vm_ctirp bRemoteInUse=false bPrivacy=false CallSelectStatus=0
CallingPartyPI=True CallingPartyDisplayNamePI=True CalledPartyPI=True
CalledPartyDisplayNamePI=True OriginalCalledPartyPI=True]
12:46:00.424 CST %JTAPI-JTAPIIMPL-7-UNK: {(P1-tacjtapiuser) GCID=(1,9040)->ACTIVE}
Initializing to OFFERING for 8000:cue_pt Cause=CAUSE_NORMAL Reason= 1
12:46:00.424 CST %JTAPI-JTAPI-7-UNK: [[3001:cue_pt/(P1-tacjtapiuser) GCID=
(1,9040)->ACTIVE]->IDLE]creating external connection for 3001:cue_pt
12:46:00.424 CST %JTAPI-JTAPI-7-UNK: { CcnCall=Call:[GCID=(9040/1),CID=25626132]
Connection=[3001:cue_pt/(P1-tacjtapiuser) GCID=(1,9040)->ACTIVE]->IDLE: creating
new Connection for CCNCall }
12:46:00.425 CST %JTAPI-JTAPI-7-UNK:[9040/1]CallImpl.deliverEvents(): for all
1 observers
12:46:00.430 CST %JTAPI-JTAPI-7-UNK.(P1-tacjtapiuser)[SS_TEL_ROUTE_CALL_EV][[
8000:cue_pt/(P1-tacjtapiuser) GCID=(1,9040)->ACTIVE]->OFFERED]Request: redirect
(8501, REDIRECT_NORMAL, DEFAULT_SEARCH_SPACE, CALLED_ADDRESS_UNCHANGED,
REDIRECT,8501,null,REDIRECT_WITHOUT_MODIFIED_CALLING_PARTY,1)
12:46:00.430 CST %JTAPI-PROTOCOL-7-UNK.(P1-192.168.100.10)
[SS_TEL_ROUTE_CALL_EV] sending: com.cisco.cti.protocol.CallRedirectRequest {
callLegID = 25626132
redirectAddress = 8501
unconditional = false
redirectReason = 0
preferredOriginalCalledParty = 8501
}
```

## 新呼叫到CTI端口

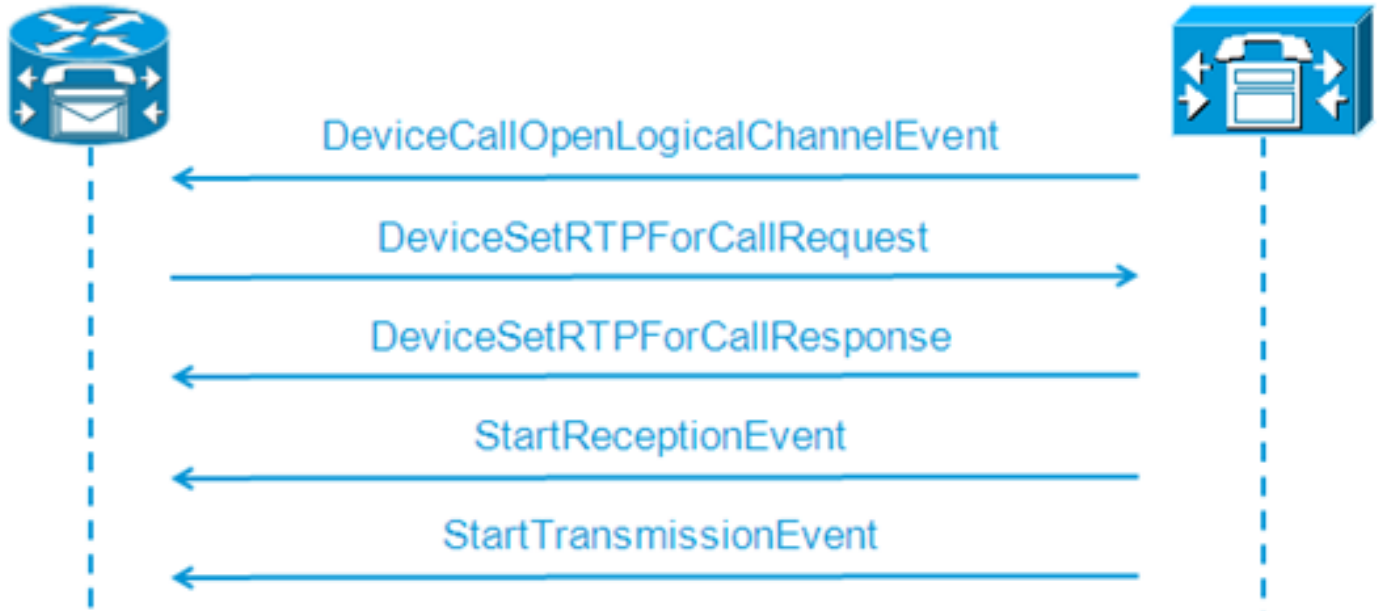
```
12:46:00.460 %JTAPI-PROTOCOL-7-UNK.(P1-192.168.100.10) received
Event: com.cisco.cti.protocol.NewCallEvent {
deviceName = cue_ctiport1
callLegID = 25626133
callID = 9040
callingParty = 3001
calledParty = 8501
originalCalledParty = 8000
reason = 6
lastRedirectingParty = 8000
callingPartyDeviceName = SEP0023331C29EC
}
12:46:00.463 %JTAPI-PROTOCOL-7-UNK.(P1-192.168.100.10) received
Event: com.cisco.cti.protocol.CallStateChangedEvent {
callLegID = 25626133
state = 2
}
12:46:00.464 %JTAPI-PROTOCOL-7-UNK.(P1-192.168.100.10) received
Response: com.cisco.cti.protocol.CallRedirectResponse {
result = 0
}
12:46:00.468 %JTAPI-PROTOCOL-7-UNK.(P1-192.168.100.10) received
Event: com.cisco.cti.protocol.CallStateChangedEvent {
callLegID = 25626132
state = 1
farEndpointSpecified = true
fwdDestinationAddress =
reason = 68501
callingParty = 3001
callingPartyName = Ext 3001 - Phone
calledParty = 8000 }
12:46:00.481 %JTAPI-JTAPIIMPL-7-UNK: {(P1-tacjtapiuser) GCID=(1,9040)->ACTIVE}
Initializing to OFFERING for 8501:cue_pt Cause=CAUSE_REDIRECTED Reason= 6
12:46:00.481 %JTAPI-JTAPIIMPL-7-UNK: {(P1-tacjtapiuser) GCID=(1,9040)->ACTIVE}
Received a redirected call -- lastRedAddress is 8000
12:46:00.487 %JTAPI-CTI-7-UNK.(P1-tacjtapiuser){Line:cue_ctiport1:8501:cue_pt.
```

```
(1,24)|Call:[GCID=(9040/1),CID=25626133]} CallStateChanged [ state=OFFERING  
cause=NOERROR]  
12:46:00.489 %JTAPI-CTI-7-UNK.(P1-tacjtapiuser){Line:cue_vm_ctirp:8000:cue_pt.  
(1,28)|Call:[GCID=(9040/1),CID=25626132]} CallStateChanged [ state=IDLE cause=  
NOERROR destType=IN_CLUSTER destCM=1 fwdDestination=8501]
```

## CTI端口接受重定向呼叫

```
12:46:00.490 %JTAPI-JTAPI-7-UNK.(P1-tacjtapiuser)[SS_TEL_CALL_CONN_OFFERED:8501]  
[[8501:cue_pt/(P1-tacjtapiuser) GCID=(1,9040)->ACTIVE]->OFFERED]Request: accept()  
12:46:00.491 %JTAPI-PROTOCOL-7-UNK.(P1-192.168.100.10) [SS_TEL_CALL_  
CONN_OFFERED:8501] sending: com.cisco.cti.protocol.CallAcceptRequest {  
callLegID = 25626133  
}  
12:46:00.495 %JTAPI-PROTOCOL-7-UNK.(P1-192.168.100.10) received Response:  
com.cisco.cti.protocol.CallAcceptResponse {  
result = 0  
}  
12:46:00.498 %JTAPI-PROTOCOL-7-UNK.(P1-192.168.100.10) received Event:  
com.cisco.cti.protocol.CallStateChangedEvent {  
callLegID = 25626133  
state = 3  
12:46:00.499 %JTAPI-CTI-7-UNK.(P1-tacjtapiuser){Line:cue_ctiport1:8501:cue_pt.  
(1,24)|Call:[GCID=(9040/1),CID=25626133]} CallStateChanged [ state=ACCEPTED  
cause=NOERROR]  
12:46:00.502 %JTAPI-JTAPIIMPL-7-UNK.(P1-tacjtapiuser) Terminal "cue_ctiport1"  
in service  
12:46:00.503 %JTAPI-JTAPIIMPL-7-UNK:((P1-tacjtapiuser) GCID=(1,9040)->ACTIVE)  
Handling  
External STATE_RINGBACK for 3001:cue_pt  
12:46:00.517 %JTAPI-PROTOCOL-7-UNK.(P1-192.168.100.10)  
[ENG_TASK:0x98bca5a08_voicebrowser.aef] sending:  
com.cisco.cti.protocol.CallAnswerRequest {  
callLegID = 25626133  
}  
12:46:00.522 %JTAPI-PROTOCOL-7-UNK.(P1-192.168.100.10) received Response:  
com.cisco.cti.protocol.CallAnswerResponse {  
result = 0  
}  
12:46:00.530 %JTAPI-PROTOCOL-7-UNK.(P1-192.168.100.10) received Event:  
com.cisco.cti.protocol.CallStateChangedEvent {  
callLegID = 25626133  
state = 8
```

## 媒体协商

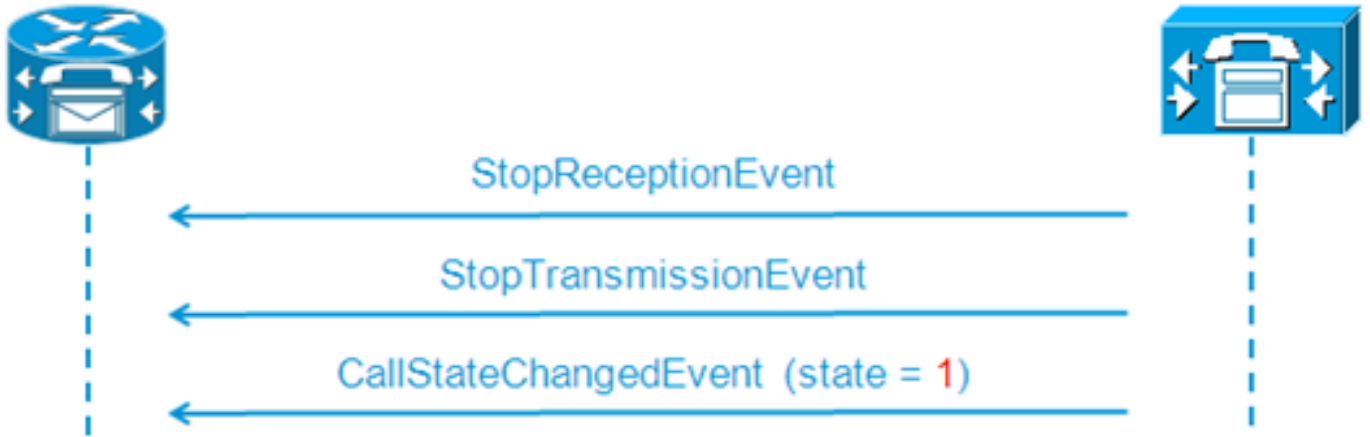


```

12:46:00.531 %JTAPI-PROTOCOL-7-UNK. (P1-192.168.100.10) received Event:
com.cisco.cti.protocol.DeviceCallOpenLogicalChannelEvent {
callLegID           = 25626133
compressionType = 4
}
12:46:00.531 %JTAPI-CTI-7-UNK. (P1-tacjtapiuser) {Line:cue_ctiport1:8501:
cue_pt. (1,24) |Call: [GCID=(9040/1),CID=25626133]} CallStateChanged
[ state=CONNECTED cause=NOERROR]
12:46:00.537 %JTAPI-JTAPI-7-UNK. (P1-tacjtapiuser) [SS_TEL_OPEN_LOGICAL_CHANNEL:
8501][cue_ctiport1]
Request: setRTPParams(CiscoRTPParams192.168.105.224/16384)
12:46:00.537 %JTAPI-PROTOCOL-7-UNK. (P1-192.168.100.10) [SS_TEL_OPEN_
LOGICAL_CHANNEL:8501] sending:
com.cisco.cti.protocol.DeviceSetRTPForCallRequest {
callLegID           = 25626133
ipAddress          = -529946432
rtpPortNumber     = 16384
}
12:46:00.540 %JTAPI-PROTOCOL-7-UNK. (P1-192.168.100.10) received Response:
com.cisco.cti.protocol.DeviceSetRTPForCallResponse {
result = 0
}
12:46:00.591 %JTAPI-PROTOCOL-7-UNK. (P1-192.168.100.10) received Event:
com.cisco.cti.protocol.StartReceptionEvent {
callLegID = 25626133
ipAddr = -529946432
rtpPortNumber = 16384
compressionType = 4
}
12:46:00.596 %JTAPI-PROTOCOL-7-UNK. (P1-192.168.100.10) received Event:
com.cisco.cti.protocol.StartTransmissionEvent {
callLegID = 25626133
ipAddr = -1167415104
rtpPortNumber = 22668
compressionType = 4
}
  
```

呼叫断开





```

12:46:09.438 %JTAPI-PROTOCOL-7-UNK. (P1-192.168.100.10) received Event:
com.cisco.cti.protocol.StopReceptionEvent {
callLegID = 25626133
}
12:46:09.438 %JTAPI-PROTOCOL-7-UNK. (P1-192.168.100.10) received Event:
com.cisco.cti.protocol.StopTransmissionEvent {
callLegID = 25626133
}
12:46:09.441 %JTAPI-PROTOCOL-7-UNK. (P1-192.168.100.10) received Event:
com.cisco.cti.protocol.CallStateChangedEvent {
callLegID                = 25626133
state = 1
cause = 16
12:46:09.443 %JTAPI-CTI-7-UNK. (P1-tacjtapiuser) {Line:cue_ctiport1:8501:
cue_pt. (1,24) |Call: [GCID=(9040/1),CID=25626133]} CallStateChanged
[ state=IDLE cause=NORMALCALLCLEARING]

```

## MWI开/关信令

### CUE为线路3001打开MWI灯

```

12:46:02.714 CST %JTAPI-JTAPI-7-UNK. (P1-tacjtapiuser) [Thread-88] [8501:cue_pt]
Request:
setMessageWaiting ( 3001,true )
12:46:02.714 CST %JTAPI-PROTOCOL-7-UNK. (P1-192.168.100.10) [Thread-88]
sending: com.cisco.cti.protocol.LineSetMessageWaitingRequest {
sequenceNumber = 57
lineName      = 3001
lampMode = 2
}
12:46:02.718 CST %JTAPI-PROTOCOL-7-UNK. (P1-192.168.100.10) received
Response: com.cisco.cti.protocol.LineSetMessageWaitingResponse {
sequenceNumber = 57
result = 0
}

```

### 已拨DTMF号码“3”，从邮箱中删除消息

```

12:55:52.145 CST %JTAPI-PROTOCOL-7-UNK. (P1-192.168.100.10) received Event:
com.cisco.cti.protocol.DtmfEvent {
eventSequence = 70
callLegID = 25626160
digit       = 3
}

```

```
}
12:55:52.145 CST %JTAPI-CTIIMPL-7-UNK. (P1-192.168.100.10) EventThread handling
event com.cisco.cti.protocol.DtmfEvent[70]
12:55:52.146 CST %JTAPI-CTI-7-UNK. () {Line:cue_ctiport1:8501:cue_pt.(1,64)|Call:
[GCID=(9047/1),CID=25626160]}
DTMF [digit=3]
```

## CUE关闭线路3001的MWI灯

```
12:55:52.209 CST %JTAPI-JTAPI-7-UNK. (P1-tacjtapiuser) [Thread-86] [8501:cue_pt]
Request: setMessageWaiting ( 3001,false )
12:55:52.209 CST %JTAPI-PROTOCOL-7-UNK. (P1-192.168.100.10) [Thread-86] sending:
com.cisco.cti.protocol.LineSetMessageWaitingRequest {
sequenceNumber = 62
lineName           = 3001
lampMode = 1
}
12:55:52.212 CST %JTAPI-PROTOCOL-7-UNK. (P1-192.168.100.10) received Response:
com.cisco.cti.protocol.LineSetMessageWaitingResponse {
sequenceNumber = 62
result = 0
}
```

## 实时CCN日志

( 实时CCN日志的输出 )

这是收集实时CCN日志时，此处上一个示例中的相同呼叫的显示方式。

## 呼叫建立

```
12:46:00.425 ACCN TELS 0 assigned STANDARD-worker-8
12:46:00.425 ACCN TELS 0 Route Connection=[8000:cue_pt/(P1-tacjtapiuser) GCID=
(1,9040)->ACTIVE]->OFFERED, reason=1...
12:46:00.426 ACCN TELS 0 Call.received() JTAPICallContact[id=7,type=Cisco JTAPI
Call,implId=9040/1,active=true,state=CALL_RECEIVED,inbound=true...
12:46:00.429 ACCN TELS 0 Route Connection: [8000:cue_pt/(P1-tacjtapiuser)
GCID=(1,9040)->ACTIVE]->OFFERED, CTI Port selected: TP[id=0,implId=8501,
state=IN_USE]
12:46:00.429 ACCN TELS 0 RouteCallObserver.callChangedEvent: redirecting to
8501, css=default
12:46:00.480 ACCN TELS 0 Call.associated() JTAPICallContact[id=7,type=Cisco
JTAPI Call,implId=9040/1,active=true,state=CALL_RECEIVED,
12:46:00.480 ACCN TELS 0 Route Connection: [8000:cue_pt/(P1-tacjtapiuser)
GCID=(1,9040)->ACTIVE]->OFFERED has 1 current sessions active.
12:46:00.484 ACCN TELS 0 CallID: 7, MediaID: 9040/1 CallCtlConnOfferedEv
received for CTI Port: 8501, lastRedirectedAddress: 8000
12:46:00.490 ACCN TELS 0 assigned STANDARD-worker-9
12:46:00.490 ACCN TELS 0 Route TR[num=8000], event=(P1-tacjtapiuser) 9040/1
CallCtlConnDisconnectedEv 8000:cue_pt [#108] Cause:100 CallCtlCause:0
CiscoCause:0 CiscoFeatureReason:6, cause=CAUSE_NORMAL[100],
meta=META_CALL_REMOVING_PARTY[131]
12:46:00.499 ACCN TELS 0 CallID: 7, MediaID: 9040/1 Accepting call for CTI
Route Point: 8000 on CTI Port: 8501, ciscoCause=31
12:46:00.501 ACCN TELS 0 Call.accepted() JTAPICallContact[id=7,type=Cisco
JTAPI Call,implId=9040/1,active=true,state=CALL_RECEIVED...
12:46:00.501 ACCN TELS 0 CallID:7 MediaId:9040/1, TerminalConnection to
Terminal: cue_ctiport1 is RINGING, [8501:cue_pt/(P1-tacjtapiuser)
GCID=(1,9040)->ACTIVE]->ALERTING
12:46:00.504 ACCN TELS 0 CallID:7 MediaId:9040/1 com.cisco.jtapi.
```

```
CiscoTermInServiceEvImpl received
12:46:00.504 ACCN TELS 0 TR[num=8000] Get TriggerMap[] return:
{secondaryDialogGroup=0, primaryDialogGroup=0}
12:46:00.513 ACCN TELS 0 Call.attributed() JTAPICallContact[id=7,type=Cisco
JTAPI Call,implId=9040/1,active=true,state=CALL_RECEIVED,...
12:46:00.513 ACCN TELS 0 CallID:7 MediaId:9040/1 Task:41000000008 associated
with Task ID: 41000000008
12:46:00.533 ACCN TELS 0 CallID:7 MediaId:9040/1 Task:41000000008,
TerminalConnection to Terminal:cue_ctiport1 is ACTIVE
12:46:00.534 ACCN TELS 0 Call.answered() JTAPICallContact[id=7,type=
Cisco JTAPI Call,implId=9040/1,active=true,state=CALL_ANSWERED,...
12:46:00.536 ACCN TELS 0 CallID:7 MediaId:9040/1 Task:41000000008
com.cisco.jtapi.CiscoMediaOpenLogicalChannelEvImpl received
12:46:00.593 ACCN TELS 0 CallID:7 MediaId:9040/1 Task:41000000008
com.cisco.jtapi.CiscoRTPInputStartedEvImpl received
12:46:00.597 ACCN TELS 0 CallID:7 MediaId:9040/1 Task:41000000008
com.cisco.jtapi.CiscoRTPOutputStartedEvImpl received
```

## 呼叫断开

```
12:46:09.442 ACCN TELS 0 CallID:7 MediaId:9040/1 Task:41000000008
com.cisco.jtapi.CiscoRTPInputStoppedEvImpl received
12:46:09.443 ACCN TELS 0 CallID:7 MediaId:9040/1 Task:41000000008
com.cisco.jtapi.CiscoRTPOutputStoppedEvImpl received
12:46:09.447 ACCN TELS 0 CallID:7 MediaId:9040/1 Task:41000000008
gets TermConnDroppedEv, meta code:132, cause code:100
12:46:09.447 ACCN TELS 0 CallID:7 MediaId:9040/1 Task:41000000008,
TerminalConnection to Terminal: cue_ctiport1 is DROPPED, 9040/1
12:46:09.448 ACCN TELS 0 CallID:7 MediaId:9040/1 is removed from call session
mapping in Session[id=0x60db88402,parent=null,active=true,state=SESSION_IN_USE,
time=1354733160426], result:true
12:46:09.466 ACCN TELS 0 Call.abandoned() JTAPICallContact[id=7,type=Cisco
JTAPI Call,implId=9040/1,active=false,state=CALL_DISCONNECTED,...
12:46:09.466 ACCN TELS 0 CallID:7 MediaId:9040/1 Task:41000000008, released TP
[type=Cisco CTI Port,id=0,implId=8501,active=false,state=IDLE] from 8000, and
releasing udpPort 16384
12:46:09.467 ACCN TELS 0 CallID:7 MediaId:9040/1 Task:41000000008
com.cisco.jtapi.TermObservationEndedEvImpl received
```

## 故障排除案例研究

### 连接问题

在此场景中，由于CUE和CUCM之间缺乏连接，CUE端口和触发器不向CUCM注册。

```
CUE# show log name CiscoJtapi1.log tail
!! or show log name CiscoJtapi2.log tail
456: 13:20:28.331 CDT %JTAPI-MISC-7-UNK.(P20-) started preloading classes
457: 13:20:28.331 CDT %JTAPI-MISC-7-UNK.(P20-) finished preloading classes
461: 13:20:28.331 CDT %JTAPI-CTI-7-UNK.(P20-) EventThread queue size
threshold is 25
462: 13:20:28.331 CDT %JTAPI-CTI-7-UNK.(P20-) Provider retry interval is set
to 30 seconds
463: 13:20:28.331 CDT %JTAPI-CTI-7-UNK.(P20-) Client desired server heartbeat
time is set to 30 seconds
464: 13:20:28.331 CDT %JTAPI-CTI-7-UNK.(P20-) CTI request timeout is is set to
30 seconds
465: 13:20:28.331 CDT %JTAPI-CTI-7-UNK.(P20-) Provider open request timeout
is set to 200 seconds
467: 13:20:28.331 CDT %JTAPI-CTI-7-UNK.(P20-) Provider Reconnect attempts is
```

```

set to 0
468: 13:20:28.331 CDT %JTAPI-CTI-7-UNK.(P20-) JAVA Socket Connect Timeout is
set to 15 seconds
469: 13:20:28.332 CDT %JTAPI-CTIIMPL-7-UNK.(P20-) Provider.info(CCMEncryption:
:encryptPassword was successful)
471: 13:20:28.334 CDT %JTAPI-JTAPIIMPL-7-UNK.ProviderImpl(): calling
jtapiProperties.getSecurityPropertyForInstance()
472: 13:20:28.334 CDT %JTAPI-JTAPIIMPL-7-UNK.(P20-tacjtapiuser ) TraceModule:
JTAPI version Cisco Jtapi version 7.0(1.1000)-1 Release
473: 13:20:28.334 CDT %JTAPI-JTAPIIMPL-7-UNK.(P20-tacjtapiuser ) Route Select
Timeout is 5000 msec
474: 13:20:28.335 CDT %JTAPI-JTAPIIMPL-7-UNK.(P20-tacjtapiuser ) Jtapi post
condition timeout is set to 15 seconds
476: 13:20:28.335 CDT %JTAPI-CTIIMPL-7-UNK.(P20-tacjtapiuser ) Opening server
"192.168.100.10" login "tacjtapiuser "
477: 13:20:28.335 CDT %JTAPI-CTIIMPL-7-UNK.(P20-tacjtapiuser ) ProviderID =
P20-tacjtapiuser 478: 13:20:28.337 CDT %JTAPI-CTIIMPL-7-UNK.(P20-tacjtapiuser )
Trying to create normal socket connection to 192.168.100.10
479: 13:20:38.338 CDT %JTAPI-JTAPI-7-UNK:[DefaultJtapiPeer]PlatformExceptionImpl
caught:
Unable to create provider --

```

**注意：**时间戳秒数从13:20:28到13:20:38;因此，我们可以知道CUE在确认无法创建提供程序之前10秒无法打开TCP套接字。

## 身份验证问题

在此场景中，CUE端口和触发器无法向CUCM注册，因为在CUE和CUCM之间配置的密码不匹配。

## CCN日志

```

CUE# show trace buffer tail
Press CTRL-C to exit...
140053.173 ACCN TELS 0 TAPIPortGroup Leaving getActiveCCM(), retvalnull
140123.184 ACCN TELS 0 TAPIPortGroup Enter getActiveCCM()
140123.184 ACCN TELS 0 TAPIPortGroup getActiveCCM() subsystemstate3
140123.184 ACCN TELS 0 TAPIPortGroup getActiveCCM() subsystemJTAPI is not
in service or partial service
140123.184 ACCN TELS 0 TAPIPortGroup Leaving getActiveCCM(), retvalnull

```

## atrace.log

```

14:12:18.681 ACCN TELS 0 JTAPI_PROVIDER_EVENT:JTAPI Provider state is changed:
JTAPI provider name=192.168.100.10,Event=ProvShutdownEv received
14:12:18.682 ACCN TELS 0 SS_LOGIN:JTAPI Login String: Module=JTAPI Subsystem,
JTAPI login string=192.168.100.10;login=tacjtapiuser ;passwd=****;appinfo=
Cisco IP IVR
14:12:18.682 ACCN TELS 0 PROVIDER_CLEANUP:Cleaning up JTAPI provider:
Module=JTAPI Subsystem,JTAPI provider name=192.168.100.10
14:12:18.682 ACCN TELS 0 TAPIPortGroup 1 getNumPorts() for Cisco CTI Port = 2
14:12:18.682 ACCN TELS 0 TPG[id=1,state=PARTIAL_SERVICE] removeRoute() -
TR[num=9500]
14:12:18.682 ACCN TELS 0 TPG[id=1,state=PARTIAL_SERVICE] removeRoute() -
TR[num=9000]
14:12:18.682 ACCN TELS 0 MwiAddress.clear: [addrStr=, addr=null, inService=false,
isRegistered=false]
14:12:18.682 ACCN TELS 0 MwiAddress.unregister: [addrStr=, addr=null,
inService=false, isRegistered=false]
14:12:18.682 ACCN TELS 0 TAPIPortGroup 1 getNumPorts() for Cisco CTI Port = 0
14:12:18.682 ACCN TELS 0 Number of CTI ports = 0

```

```

14:12:18.682 ACCN TELS 0 calculateSubsystemState
14:12:18.682 ACCN TELS 0 TPG[id=1,state=PARTIAL_SERVICE] Triggers: ISV = 0,
OOS = 0, PARTIAL = 0
14:12:18.682 ACCN TELS 0 TAPIPortGroup 1 getNumPorts() for Cisco CTI Port = 0
14:12:18.682 ACCN TELS 0 calculateSubsystemState -> Groups: ISV = 0, OOS = 0,
PARTIAL/OTHERS = 1
14:12:18.682 ACCN TELS 0 calculateSubsystemState -> Triggers: ENABLED = 0,
DISABLED = 2, CONFIG ERR = 0
14:12:18.682 ACCN TELS 0 calculateSubsystemState -> subsystem partial in
service, unchanged cause:
A number of route points are OOS - TR[num=9000], TR[num=9500]; A number of
CTI ports are OOS - TPG[id=1,state=PARTIAL_SERVICE].Ports[9590]
14:12:18.689 ACCN TELS 0 SS_PARTIAL_SERVICE:JTAPI subsystem in partial service:
Failure reason=A number of route points are OOS - TR[num=9000], TR[num=9500];
A number of CTI ports are OOS - TPG[id=1,state=PARTIAL_SERVICE].Ports[9590]
14:12:18.689 ACCN TELS 0 GET_NEW_PROVIDER:Attempt to get JTAPI provider
14:12:18.693 ACCN TELS 0 Calling updateJTAPIPackage: 192.168.100.10
Module=JTAPI_PROVIDER_INIT,Exception=com.cisco.jtapi.PlatformExceptionImpl:
Unable to create provider
-- bad login or password.
14:12:18.828 ACCN TELS 0 EXCEPTION:com.cisco.jtapi.PlatformExceptionImpl:
Unable to create provider
-- bad login or password.

```

## CiscoJtapi1.log / CiscoJtapi2.log

```

6318: 14:22:26.653 CDT %JTAPI-CTIIMPL-7-UNK.(P62-tacjtapiuser ) Trying to
create normal socket connection to 192.168.100.10
6319: 14:22:26.654 CDT %JTAPI-CTIIMPL-7-UNK.(P62-tacjtapiuser ) connected
6321: 14:22:26.654 CDT %JTAPI-PROTOCOL-7-UNK.(P62-192.168.100.10)
[SS_TEL_REINIT] sending: com.cisco.cti.protocol.ProviderOpenRequest {
provider = 192.168.100.10
qbcClientVersion = Cisco JTAPI 7.0(1.1000)-1 Release
login = com.cisco.cti.protocol.UnicodeString {
unicodedisplayName = tacjtapiuser
}
filter = com.cisco.cti.protocol.ProviderEventFilter {
deviceRegistered = true
deviceUnregistered = true
desiredServerHeartbeatTime = 30
}
6331: 14:22:26.781 CDT %JTAPI-PROTOCOL-7-UNK(P62-192.168.100.10)
received Event: com.cisco.cti.protocol.ProviderOpenCompletedEvent {
eventSequence = 251
reason = -1932787616
providerInfoString = 7.1.2.21900-5
failureDescription = Directory login failed - authentication failed.
providerId = 16777255
}
6333: 14:22:26.781 CDT %JTAPI-PROTOCOL-7-UNK.(P62-192.168.100.10)
received Event: com.cisco.cti.protocol.ProviderClosedEvent {
eventSequence = 252
reason = 4
}
6338: 14:22:26.781 CDT %JTAPI-PROTOCOL-7-UNK.(P62-192.168.100.10)
Received ProviderClosedEvent
6339: 14:22:26.781 CDT %JTAPI-PROTOCOL-7-UNK.(P62-192.168.100.10)
received Event: com.cisco.cti.protocol.ProviderOutOfServiceEvent {
eventSequence = 253
PROVIDER_OUT_OF_SERVICE_EVENT = 200
}
6343: 14:22:26.782 CDT %JTAPI-JTAPI-7-UNK:[DefaultJtapiPeer]
PlatformExceptionImpl caught: Unable to create provider -- bad login or password.

```

```
6344: 14:22:26.881 CDT %JTAPI-CTIIMPL-7-UNK.(P62-192.168.100.10) ReceiveThread:
caught java.net.SocketException: The socket was closed
```

## 用户未启用CTI

在此场景中，CUE端口和触发器无法向CUCM注册，因为JTAPI应用用户尚未添加到CUCM端的标准CTI启用权限组。因此，即使用户凭证相应进行身份验证，JTAPI用户(在本例中为tacjtapiuser)也无法通过CTI和JTAPI控制任何设备。

## CiscoJtapi1.log / CiscoJtapi2.log

```
11590:14:41:08.768 CDT %JTAPI-PROTOCOL-7-UNK.(P115-192.168.100.10)
[ProviderRetryThread] sending:
com.cisco.cti.protocol.ProviderOpenRequest {
provider = 192.168.100.10
qbcClientVersion = Cisco JTAPI 7.0(1.1000)-1 Release
login = com.cisco.cti.protocol.UnicodeString {
unicodedisplayName = tacjtapiuser
}
applicationID = Cisco IP IVR
desiredServerHeartbeatTime = 30
requestTimer = 0
cmAssignedApplicationID = 0
pluginName = CiscoJTAPI
}
11593:14:41:08.770 CDT %JTAPI-PROTOCOL-7-UNK.(P115-192.168.100.10)
received Response: com.cisco.cti.protocol.ProviderOpenResponse {
sequenceNumber = 117
result = 0
providerInfoString = 7.1.2.21900-5
clientHeartbeat = 30
serverHeartbeat = 30
requestTimer = 5
pluginVersion = 7.1.2.10000-5
pluginLocation = http://192.168.100.10/plugins/
providerId = 16777220
}
11600: 14:41:08.899 CDT %JTAPI-PROTOCOL-7-UNK.(P115-192.168.100.10)
received Event: com.cisco.cti.protocol.ProviderOpenCompletedEvent {
eventSequence = 461
reason = -1932787617
sequenceNumber = 117
failureDescription = Directory login failed - User not present in Standard
CTI Users group.
providerId = 16777220
}
11608:14:41:08.900 CDT %JTAPI-PROTOCOL-7-UNK.(P115-192.168.100.10)
received Event:
com.cisco.cti.protocol.ProviderOutOfServiceEvent {
eventSequence = 463
PROVIDER_OUT_OF_SERVICE_EVENT = 200
}
```

## CUCM CTI管理器服务已关闭

在此场景中，CUE端口和触发器无法注册，因为CUCM CTI管理器服务已关闭或处于异常状态。CUE尝试连接JTAPI TCP端口2748时，它收到“连接拒绝”错误。

```
18956: 16:25:45.516 CDT %JTAPI-CTIIMPL-7-UNK.(P200-) Provider.
```

```

info(CCMEncryption::encryptPassword was successful)
18957: 16:25:45.516 CDT %JTAPI-CTIIMPL-7-UNK.(P200-) application did
not set appinfo, creating default
18958: 16:25:45.516 CDT %JTAPI-JTAPIIMPL-7-UNK.ProviderImpl(): calling
jtapiProperties.getSecurityPropertyForInstance()
18959: 16:25:45.516 CDT %JTAPI-JTAPIIMPL-7-UNK.(P200-tacjtapiuser )
TraceModule: JTAPI version Cisco Jtapi version 7.0(1.1000)-1 Release
18960: 16:25:45.516 CDT %JTAPI-JTAPIIMPL-7-UNK.(P200-tacjtapiuser )
Route Select Timeout is 5000 msecs
18961: 16:25:45.516 CDT %JTAPI-JTAPIIMPL-7-UNK.(P200-tacjtapiuser )
Jtapi post condition timeout is set
to 15 seconds
18962: 16:25:45.516 CDT %JTAPI-JTAPIIMPL-7-UNK.(P200-tacjtapiuser )
IgnoreFwdDestination
set to false
18963: 16:25:45.516 CDT %JTAPI-CTIIMPL-7-UNK.(P200-tacjtapiuser )
Opening server "192.168.100.10" login "tacjtapiuser "
18964: 16:25:45.516 CDT %JTAPI-CTIIMPL-7-UNK.(P200-tacjtapiuser )
ProviderID = P200-tacjtapiuser
18965: 16:25:45.517 CDT %JTAPI-CTIIMPL-7-UNK.(P200-tacjtapiuser )
Trying to create normal socket connection to 192.168.100.10
18966: 16:25:45.518 CDT %JTAPI-JTAPI-7-UNK:[DefaultJtapiPeer]
PlatformExceptionImpl caught:
Unable to create provider -- 192.168.100.10/192.168.100.10:2748 -
Connection refused

```

## 配置不匹配

在此场景中，CUE无法将JTAPI触发器注册为数字9999，因为它应匹配的CTI RP未配置，或者尚未添加到CUCM端用户的“可控设备”中。CUE在从CUCM接收**GetDeviceInfoFetchRequest**并注意到提供程序域中没有设备（指该用户所有可控设备，该设备将匹配其在本地配置的触发器号）后实现此目的。然后，CUE不会尝试为该特定触发器发送**DeviceOpenRequest**，而只在跟踪中报告异常。CUE仍尝试注册CUCM发送的提供商域内的所有其他设备。

```

13:27:58.864 CST %JTAPI-PROTOCOL-7-UNK.(P1-192.168.100.10) received Response:
com.cisco.cti.protocol.GetDeviceInfoFetchRequest {
com.cisco.cti.protocol.DeviceInfo {
name = cue_vm_ctirp
}
}
13:27:58.960 CST %JTAPI-PROTOCOL-7-UNK.(P1-192.168.100.10) [SS_TEL_INIT]
sending: com.cisco.cti.protocol.DeviceGetLineInfoRequest {
deviceName = cue_vm_ctirp
}
13:27:58.962 CST %JTAPI-PROTOCOL-7-UNK.(P1-192.168.100.10) [SS_TEL_INIT]
sending: com.cisco.cti.protocol.GetLineInfoFetchRequest
13:27:58.964 CST %JTAPI-PROTOCOL-7-UNK.(P1-192.168.100.10) received Response:
com.cisco.cti.protocol.GetLineInfoFetchRequest{
name = 8000
}
}
13:27:58.966 CST %JTAPI-CTI-7-UNK(P1-tacjtapiuser) DeviceMap: adding device
"cue_vm_ctirp"
13:27:59.427 CST %JTAPI-JTAPI-7-UNK: InvalidArgumentExceptionImpl caught:
Address 9999 is not in provider's domain.

```

**注意：**即使触发器999在CUE中本地配置，它也不是从CUCM接收的提供程序域的一部分，因此不注册。

**CUE继续打开8000行；包含在提供商的域中**

```

13:28:00.953 CST %JTAPI-PROTOCOL-7-UNK.(P1-192.168.100.10) [SS_TEL_INIT]
sending: com.cisco.cti.protocol.DeviceOpenRequest {
deviceName = cue_vm_ctirp
13:28:00.979 CST %JTAPI-PROTOCOL-7-UNK.(P1-192.168.100.10) [SS_TEL_INIT]
sending: com.cisco.cti.protocol.LineOpenRequest {
deviceName = cue_vm_ctirp
lineName = 8000
13:28:00.983 CST %JTAPI-JTAPIIMPL-7-UNK:cue_vm_ctirp: Lines opened
13:28:00.997 CST %JTAPI-PROTOCOL-7-UNK.(P1-192.168.100.10) [SS_TEL_INIT]
sending: com.cisco.cti.protocol.DeviceRegisterDeviceRequest
deviceName = cue_vm_ctirp
13:28:01.000 CST %JTAPI-CTI-7-UNK.(P1-tacjtapiuser) DeviceMap: opening device
"cue_vm_ctirp"
13:28:01.001 CST %JTAPI-PROTOCOL-7-UNK.(P1-192.168.100.10) [SS_TEL_INIT]
sending: com.cisco.cti.protocol.LineOpenRequest {
lineName = 8000
13:28:01.012 CST %JTAPI-JTAPIIMPL-7-UNK:cue_vm_ctirp: Lines opened
13:28:01.164 CST %JTAPI-PROTOCOL-7-UNK.(P1-192.168.100.10) received Event:
com.cisco.cti.protocol.DeviceRegisteredEvent {
13:28:01.165 CST %JTAPI-PROTOCOL-7-UNK.(P1-192.168.100.10) received Event:
com.cisco.cti.protocol.DeviceInServiceEvent {
13:28:01.166 CST %JTAPI-PROTOCOL-7-UNK.(P1-192.168.100.10) received Event:
com.cisco.cti.protocol.LineInServiceEvent {
13:28:01.168 CST %JTAPI-JTAPIIMPL-7-UNK.(P1-tacjtapiuser) Terminal
"cue_vm_ctirp" in service

```

## CUCM呼叫路由问题

在此场景中，DN 3001的用户呼叫CUE以检查其VM。呼叫将呈现给CUE的VM引导(CTI RP),DN为8000。然后，CUE请求呼叫重定向到其媒体CTI端口(DN 8501)，但呼叫无法重定向，因为为DN 3001配置的CSS无权访问分配CTI端口DN的PT。

```

12:56:01.392 CST %JTAPI-PROTOCOL-7-UNK.(P1-192.168.100.10) received
Event: com.cisco.cti.protocol.NewCallEvent {
deviceName = cue_vm_ctirp
callLegID = 25626135
callID = 9041
callingParty = 3001
calledParty = 8000
originalCalledParty state = 2
}
12:56:01.404 CST %JTAPI-PROTOCOL-7-UNK.(P1-192.168.100.10)
[SS_TEL_ROUTE_CALL_EV] sending: com.cisco.cti.protocol.CallRedirectRequest {
callLegID = 25626135
redirectAddress = 8501
}
12:56:01.397 CST %JTAPI-PROTOCOL-7-UNK.(P1-192.168.100.10) received
Event: com.cisco.cti.protocol.CallStateChangedEvent {
callLegID = 25626135
state = 2
}
12:56:01.450 CST %JTAPI-PROTOCOL-7-UNK.(P1-192.168.100.10) received
Response: com.cisco.cti.protocol.FailureResponse {
result = -1932787660
description = redirect failure
}
12:56:01.450 CST %JTAPI-JTAPI-7-UNK: [[8000:cue_pt/(P1-tacjtapiuser)
GCID=(1,9041)->ACTIVE]->OFFERED]InvalidPartyExceptionImpl caught:
Request failed because of an invalid destination.
12:56:05.456 CST %JTAPI-PROTOCOL-7-UNK.(P1-192.168.100.10) received

```



```

Event: com.cisco.cti.protocol.CallStateChangedEvent {
callLegID = 25626135
state = 1
cause = 17
}
12:56:05.456 CST %JTAPI-CTI-7-UNK.(P1-tacjtapiuser){Line:cue_vm_ctirp:
8000:cue_pt.(1,28)|Call:[GCID=(9041/1),CID=25626135]}CallStateChanged
[ state=IDLE cause=USERBUSY]
12:56:05.457 CST %JTAPI-CTI-7-UNK:{ALL EXTERNAL ADDRESSES|Call(P1-tacjtapiuser)
GCID=(1,9041)->ACTIVE} ExternalCallStateChanged
[ state=IDLE cause=17 processEvent= reason =1 ]
12:56:05.457 CST %JTAPI-JTAPI-7-UNK.(P1-tacjtapiuser) 9041/1 ConnDisconnectedEv
3001:cue_pt [#160]
Cause:17 CallCtlCause:0 CiscoCause:17 CiscoFeatureReason:12
12:56:05.457 CST %JTAPI-JTAPI-7-UNK.(P1-tacjtapiuser)[(P1-192.168.100.10)
EventThread][SEP0023331C29EC] Request: getCallingTerminal()
12:56:05.457 CST %JTAPI-JTAPI-7-UNK.(P1-tacjtapiuser) 9041/1
CallCtlConnDisconnectedEv 3001:cue_pt [#161] Cause:17 CallCtlCause:0
CiscoCause:17 CiscoFeatureReason:12= 8000

```

## 许可问题

在此场景中，CUE无法注册其端口并触发，因为VM端口的许可证尚未激活。由于相同的原因，捕获中未显示任何注册尝试。

## 已解码atrace.log的摘要：

```

2551 11:45:17.178 LLMA LAPI 0 Llama: getMaxVmPortCount():
2547 11:45:17.178 LLMA LVMP 0 LlamaVmPortQuery: get(): maxCount
2551 11:45:17.178 LLMA LSDB 0 Llama: getMaxVmPortCount(): LlamaSysdbUser():
getInt(): Getting int /sw/apps/limitsManager/vmPort/query/maxCount returns 0
2551 11:45:17.178 LLMA LAPI 0 Llama: getMaxVmPortCount(): count: 0
2551 11:45:17.178 WFSP JTRG 0 WFSysdbNdJtapiTrg::getMaxSessions for trigger
for app: voicemail 0
2551 11:45:17.178 WFSP JTRG 0 WFSysdbNdJtapiTrg::commit warning session
value exceeded license max
2551 11:45:17.181 WFSP JTRG 0 com.cisco.aesop.sysdb.xactSysdbException:
Session value exceeds license limit
2551 11:45:19.654 LLMA LVMM 0 LlamaVmMbxQuery: get(): licenseStatus
2575 11:45:19.654 LLMA LSDB 0 Llama: showVoicemail(): LlamaSysdbUser():
getInt(): Getting int /sw/apps/limitsManager/vmMbx/query/licenseStatus returns 2
2575 11:45:19.657 LLMA LLMT 0 voicemail disabled, voicemail mailbox
activation count has been set to zero
3456 11:45:23.114 LLMA LAPI 0 Llama: getMaxPortCount():
2555 11:45:23.114 LLMA LPRT 0 LlamaPortQuery: get(): maxCount
3456 11:45:23.115 LLMA LSDB 0 Llama: getMaxPortCount(): LlamaSysdbUser():
getInt(): Getting int/sw/apps/limitsManager/port/query/maxCount returns 0
3456 11:45:23.115 LLMA LAPI 0 Llama: getMaxPortCount(): count: 0
3456 11:45:28.727 ACCN TELS 0 CueCiscoCall:getMajorVer() jtapi version=
7.0(1.1000)-1 majorVer=7
3456 11:45:28.785 ACCN TELS 0 JTAPI Login Str:
192.168.100.10;login=tacjtapiuser ;passwd=****;appinfo=Cisco IP IVR
3456 11:45:28.785 ACCN TELS 0 Actual Login Str:
192.168.100.10;login=tacjtapiuser ;passwd=cisco;appinfo=Cisco IP IVR
3477 11:45:31.330 ACCN TELS 0 Got JTAPI provider: Cisco Jtapi version
7.0(1.1000)-1 Release
3621 11:45:31.338 ACCN TELS 0 JTAPI_PROVIDER_EVENT:JTAPI Provider
state is changed: JTAPI provider name=192.168.100.10,Event=
ProvOutOfServiceEv received
3621 11:45:31.352 ACCN TELS 0 JTAPI_PROVIDER_EVENT:JTAPI Provider state
is changed: JTAPI provider name=192.168.100.10,Event=ProvInServiceEv received
3621 11:45:31.353 ACCN ATJT 0 checkConnectivity:

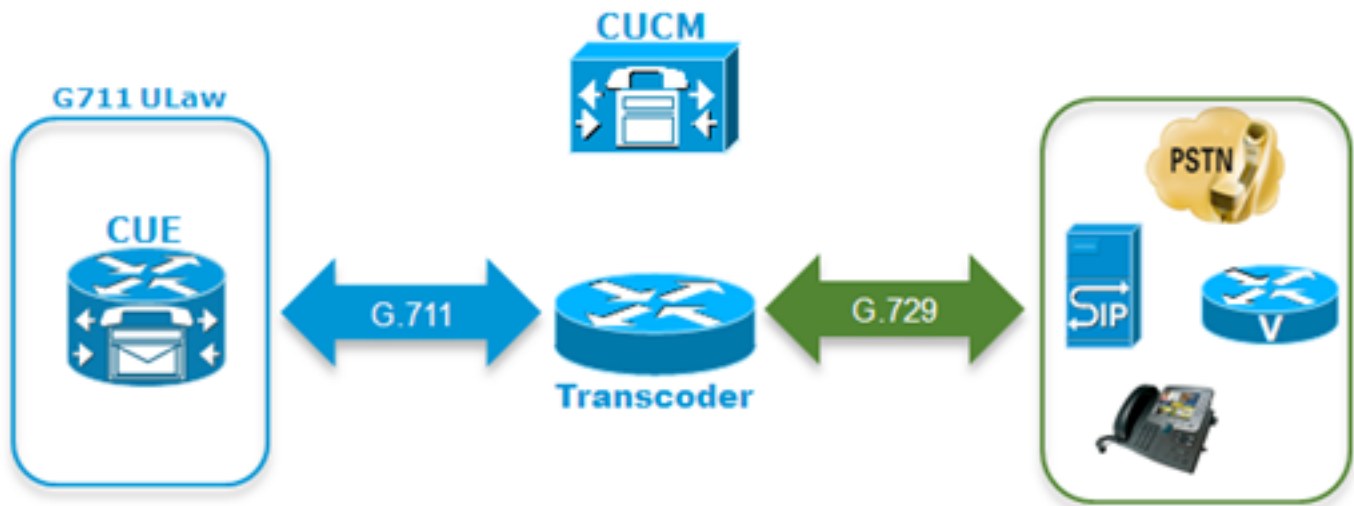
```

```
urlString:http://192.168.100.10/CCMPluginsServer/CiscoJTAPIClient.exe
3477 11:45:34.130 ACCN TELS 0 SS_OUT_OF_SERVICE:JTAPI subsystem in
out of service: Failure reason=A number of route points are OOS; A number of
CTI ports are OOS - all ports in TPG
3751 11:45:48.558 ACCN TELS 0 TAPIPortGroup: getActiveCCM() subsystemJTAPI
is not in service or partial service
```

## 最佳实践

CUE仅支持G711ulaw编解码器；因此，在几乎每个部署中，CUE都需要转码器来与使用不同编解码器（包括G711Alaw）的其他设备或中继通信。这同样适用于DTMF与仅支持带内DTMF的设备交互，其中还需要媒体终端点(MTP)资源。由于这些限制，思科建议：

- 创建隔离设备池，仅用于CUE的CTI RP和CTI端口。如果多个CUE与CUCM集成，则按CUE创建设备池。
- 仅为CUE的RP和端口创建单独的区域，并将其应用于该隔离设备池。
- 确保该区域配置为仅允许G711与所有其他区域连接。
- 确保具有可用转码资源的媒体资源组列表(MRGL)已应用到CUE的CTI RP和CTI端口的设备池，以便这些端口在需要时可以访问转码器资源。



- 如果用户无法浏览带DTMF音的语音菜单，则可能必须将MTP资源添加到CUE设备的MRGL。  
在CUCM中为CUE创建单独的VM配置文件

为避免CUCM CTI管理器最近观察到的一些问题，建议将所有电话与CUCM端的CUE的JTAPI用户关联，而不是仅与CTI RP和端口关联。

如果需要可存活远程站点电话(SRST)功能：

- 确保为CUE上的每个JTAPI触发器配置了相应的SIP触发器。
- 确保拨号对等体已添加到分支路由器，以允许呼叫在SRST模式下通过SIP路由到CUE模块。
- 在CUCM中配置每个CTI路由点的外部号码掩码以及CFU（未注册呼叫转移）字段的掩码，以确保当CUCM和CUE之间的连接丢失或自动备用路由(AAR)时，CUCM通过本地公共交换电话网(PSTN)网关路由发往分支机构模块的呼叫)。分支路由器可能还需要其他转换规则才能将入站呼叫从PSTN路由到CUE模块。
- 如果CUCM端存在直接转接到VM配置方法，并且用户希望在CME-SRST中保持此功能，则您必须在将软键转接到VM之前，将旧的虚拟DN与用于CME的呼叫转移全部(CFA)配置方法一起使用。有关详细信息，[请参阅将呼叫方直接转接到Unity Express邮箱](#)中。这是一个示例。请记住，仅当使用CME-SRST，而不是使用传统SRST和call-manager-fallback时，才能执行此操作。假设DN在200-299范围内。x201的呼叫进入。使用以下命令配置ephone-dn:

```
ephone-dn 99
number 2..
```

```
call-forward all <VM Pilot>
```

在指向CUE的拨号对等体中：使用出站转换规则和配置文件删除前缀星号("\*")并将**重定向拨号码信息服务(RDNIS)**替换回原始的3位数（例如201），或用完整的E.164号码（如果电话号码在CUE中配置了完整的DID）。确保发送到CUE的INVITE的“转接”报头与为CUE端用户配置的电话号码匹配。

## 端口注册故障排除核对表

1. **检查CUCM端的配置**：CTI Manager、CallManager和管理XML(AXL)Web服务是否已启用并启动？是否已配置CTI端口和路由点并为其分配唯一DN？JTAPI用户CTI是否已启用，它是否具有AXL API访问权限？JTAPI用户是否控制所有CTI路由点和端口？有时，最好在添加配置后重新启动所有服务器上的CTI管理器服务。但是，这可能会影响服务，并且建议安排维护窗口，因为这会影响与CUCM一起使用CTI和JTAPI的所有其他设备，如Unified Contact Center Express(UCCX)、IP Manager Assistant(IPMA)、话务台、第三方AA或ACD应用等。
2. **检查CUE端的配置**：呼叫代理是否定义为CUCM？端口许可证是否已启用？评估许可证可用于初始配置。您能ping通CUCM吗？JTAPI用户凭据是否已正确添加，以及是否已定义呼叫代理？是否已重新加载模块以应用配置更改？如果CTI RP和端口未自动从CUCM导入，请尝试在 `ccn subsystem jtapi` 下手动添加端口DN，以及每个CTI-RP的jtapi触发器，然后重新加载模块。

如果所有这些项目都已确认，则下一步是在CUE上获取JTAPI跟踪，并可能获取CUCM CTI跟踪，以进一步隔离问题。

## 相关信息

- [设置和聚集在CUE中的跟踪数据](#)
- [Cisco Unity Express系统功能故障排除](#)
- [Cisco Unity Express 的 CallManager 配置示例](#)
- [CUCM语音邮件配置文件配置](#)
- [Cisco Unity Express部署模式](#)
- [部署Cisco Unity Express的最佳实践](#)
- [CUCM转码](#)
- [CUCM MTP](#)
- [技术支持和文档 - Cisco Systems](#)