

在AS5400网关上语音和数据呼叫TDM交换的配置示例

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简介

本文详述交换在Cisco AS5400平台的时间分隔多路传输(TDM)的理论和配置。

先决条件

要求

假设，读者有ISDN呼叫信令基本的了解和同步时钟来源的分配在TDM网络的。关于TDM计时的一些背景信息在本文被提供。熟悉用Cisco IOS配置和调试命令也是有用。

使用的组件

本文档中的信息基于以下软件和硬件版本：

- Cisco AS5400、AS5350和AS5850平台
- 与IP Plus特性组的Cisco IOS软件版本12.2.2xb5

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。

规则

有关文档规则的详细信息，请参阅 [Cisco 技术提示规则](#)。

背景信息

对TDM交换的基本是在所有配置接口间共享的同步的时钟来源。如果时钟参考在端口间是不同的，接入服务器注册时钟疏漏，可以是不显明的对语音呼叫，但是原因几乎一定电传或调制解调器呼叫发生故障。所以，非常重要是外部设备(PBXes或中心局交换机)接入服务器接口与同步对一普通的主时钟参考。多数Telco或服务提供商订阅对或者产生Stratum1时钟参考并且在间他们的网络传播此。所以，在大多数情况，时钟频率保持同步区别服务提供商之间。如果在接入服务器的所有已配置的T1/E1接口保持同步那么应该有接口错误不太可能。

TDM交换路由根据呼入呼叫的拨号号码识别服务(DNIS)的呼叫。一旦接入服务器收到流入的ISDN Q.931设置信息，能然后确定呼叫哪里将发送，选择在流出接口的一条适当的承载信道，并且传送ISDN Q.931设置信息发信号下行设备一新的呼叫的出现。一旦终端设备发送CONNECT信息ISDN的Q.931，接入服务器交接在背板间的脉冲编码调制(PCM)数据流。详情参见上一个段，两个连接的网络必须有同样时钟同步保证PCM音频流或数据的无错的交换从一个接口到另一个。[网络图](#)显示通过其他接口进来在特定的PRI接口和交换的ISDN呼叫的一般概念根据在已配置的普通旧式电话服务dial-peer做的匹配。如果需要，使用IOS翻译规则，被叫/主叫号码可以被操作。

配置

AS5400平台通常安装，拨入数据、语音、传真或者调制解调器访问服务器。为了终止语音类型呼叫(语音、传真或者调制解调器)接入服务器需要合适any service， any port (ASAP)数字信号将安装的信号处理器(DSP)资源。

由于某种原因如果调制解调器、传真或者语音呼叫在接入服务器实际上没有要求终止，然而需要交换取消到备选端口，配置AS5400纯粹地操作在语音呼叫交换通过ISDN D信道信令被控制的一TDM应用程序是可能的。数据或语音呼叫可以根据DNIS (被叫号码)通过交换到另一个接口。有效地，接入服务器变为TDM语音/数据交换机。此功能经常呼叫TDM交换，虽然其他名称例如发夹、tromboning或者拨号梳理也应用对技术。通常，期限是可互换的，并且对于本文，使用期限TDM交换。没有双音多频或多频的(MF)信令音通过与ISDN。呼叫控制完成与高级数据链路控制(HDLC)被封装的D-channel消息。所以，没有对DSP资源的需要语音呼叫的，当在TDM操作模式。

接入服务器在一个流出的POTS拨号对等目的地模式使用一流入DNIS (被叫号码)配比并且路由召集一个适当的端口。使用IOS翻译规则操作呼叫路由决策的呼叫和呼叫号是可能的。

TDM交换的应用程序能包括作为小ISDN数据/voice交换的接入服务器(使用ISDN网络端协议仿真)，或者请通过备选载波(最少开销)呼叫重路由。

本文描述如何配置AS5400执行语音和数据呼叫的TDM交换。基于在呼入呼叫的DNIS做的匹配(提供在ISDN Q.931设置信息)，呼叫从一个接口交换到一个备选接口。技术在使用TDM背板例如AS5350和AS5850的其他平台也运作。

本部分提供有关如何配置本文档所述功能的信息。

注意： 有关本文档所用命令的详细信息，请使用[命令查找工具](#) ([仅限注册用户](#))。

网络图

本文档使用以下网络设置：

配置

为了允许接入服务器执行TDM交换，必须启用资源缓冲，并且可用的承载信道资源放置到池。承载信道的此池然后附加到DNIS组，允许用某些流入被叫号码将关联的资源特定的池，或者所有流入被叫号码。此输出显示了一个示例：

```
AS5400
!
resource-pool enable
!
resource-pool group resource TDM_Voice
range limit 124
!--- Up to 124 speech channels can be switched. !
resource-pool group resource TDM_Data range limit 124 !-
-- Up to 124 data channels can be switched. !!
resource-pool profile customer TDM_Switching limit base-
size all limit overflow-size 0 resource TDM_Voice speech
!--- Resources for speech calls. ! resource TDM_Data
digital ! resources for data calls ! dnis group default
!--- Default DNIS group matches all called numbers. !
```

必须启用资源缓冲功能为了允许TDM交换。资源组呼叫允许124个信道可用为语音呼叫的TDM_Voice定义。第二资源组呼叫的TDM_Data允许124个信道数据呼叫。这些编号从E1或T1端口的最大系统的派生。例如，一个8个端口E1卡有30条承载信道加上每个接口(31个信道)一信令信道8个端口的。总计是248 (8)乘的31。指定得数据的语音呼叫的半和半此处。

资源组TDM_Voice在呼叫TDM_Switching的配置文件然后安置，并且呼叫类型定义作为语音，而资源组TDM_Data定义作为数字。这通过接入服务器有效允许呼叫以语音和数据载体功能。**dnis group default**命令准许将匹配的所有流入被叫号码。定义在更加特定的被叫号码配比的DNIS组是可能的。参考[语音和数据服务配置指南的通用端口资源限制](#)欲知更多信息。

如果需要，当呼叫在特定端口，进来被叫号码可以被操作加在前面接入代码。例如：

```
AS5400
!
translation-rule 1
Rule 1 ^.% 555
!--- Match on any string, prepend with 555. ! voice-port
6/0:D translate called 1 !--- Apply translation rule 1
to port 6/0 so any !--- incoming call is prepended with
555. compand-type a-law ! voice-port 6/3:D compand-type
a-law !--- The translated called number is matched on
POTS dial-peers !--- to determine where it should be
routed. dial-peer voice 1 pots description - enable DID
(single stage dialing) on port 6/0 incoming called-
number . direct-inward-dial port 6/0:D ! dial-peer voice
2 pots description - reroute calls from 6/0 to 6/3
destination-pattern 55598842304 port 6/3:D prefix
0401890165 !
```

当呼叫在端口6/0时进来，以555前缀。如果原被叫号码是98842304，翻译的编号在dial-peer 2.变为55598842304并且配比。呼叫在端口6/3然后被派出。因为它是直接匹配，剥去原被叫号码，并且prefix命令用0401890165替换它。

数据呼叫交换相似地运作。POTS拨号对等在被叫号码配比并且处理它另一个端口。为例，如果呼叫在端口6/4进来用被叫号码5551000，它是交换的端口6/7用一个新的被叫号码5552000。同样，如

果呼叫在端口6/7进来用被叫号码5552000，它在端口6/4交换用一个新的被叫号码5551000。

```
AS5400
!
dial-peer voice 3 pots
description - enable DID on port 6/4
incoming called-number
direct-inward-dial
port 6/4:D
!
dial-peer voice 4 pots
description - enable DID on port 6/7
incoming called-number
direct-inward-dial
port 6/7:D
!
dial-peer voice 12 pots
description - reroute calls from 6/4 to 6/7
destination-pattern 5551000
port 6/7:D
prefix 5552000
!
dial-peer voice 13 pots
description - reroute calls from 6/7 to 6/4
destination-pattern 5552000
port 6/4:D
prefix 5551000
!
```

验证

使用本部分可确认配置能否正常运行。

[命令输出解释程序 \(仅限注册用户 \)](#) (OIT) 支持某些 **show** 命令。使用 OIT 可查看对 **show** 命令输出的分析。

- **show run** —显示运行作为TDM交换机接入服务器的完全配置。

```
multi-5-19#show run Building configuration... Current configuration : 3110 bytes !! Last
configuration change at 13:18:39 UTC Wed Jun 19 2002 ! NVRAM config last updated at 20:45:12 UTC
Sat Jan 8 2000 ! version 12.2 service timestamps debug datetime msec localtime service
timestamps log uptime no service password-encryption ! hostname multi-5-19 ! enable password
cisco !!! resource-pool enable ! resource-pool group resource TDM_Voice range limit 124 !
resource-pool group resource TDM_Data range limit 124 ! resource-pool profile customer
TDM_Switching limit base-size all limit overflow-size 0 resource TDM_Data digital resource
TDM_Voice speech dnis group default dial-tdm-clock priority 1 6/0 ! ! ! ! ip subnet-zero ip cef
! isdn switch-type primary-net5 ! ! ! ! ! ! ! fax interface-type fax-mail mta receive maximum-
recipients 0 ! controller E1 6/0 pri-group timeslots 1-31 ! controller E1 6/1 ! controller E1
6/2 ! controller E1 6/3 pri-group timeslots 1-31 ! controller E1 6/4 pri-group timeslots 1-31 !
controller E1 6/5 ! controller E1 6/6 ! controller E1 6/7 pri-group timeslots 1-31 !
translation-rule 1 Rule 1 ^.% 555 ! translation-rule 2 Rule 2 ^.% 666 ! ! ! interface
FastEthernet0/0 no ip address duplex auto speed auto ! interface FastEthernet0/1 no ip address
duplex auto speed auto ! interface Serial0/0 no ip address shutdown clockrate 2000000 !
interface Serial0/1 no ip address shutdown clockrate 2000000 ! interface Serial6/0:15 no ip
address isdn switch-type primary-net5 isdn incoming-voice modem no cdp enable ! interface
Serial6/3:15 no ip address isdn switch-type primary-net5 isdn incoming-voice modem no cdp enable
! interface Serial6/4:15 no ip address isdn switch-type primary-net5 isdn protocol-emulate
network no cdp enable ! interface Serial6/7:15 no ip address isdn switch-type primary-net5 isdn
protocol-emulate network no cdp enable ! interface Group-Async0 physical-layer async no ip
```

```
address ! ip classless ! no ip http server ! ! call rsvp-sync ! voice-port 6/0:D translate
called 1 compand-type a-law ! voice-port 6/3:D translate called 2 compand-type a-law ! voice-
port 6/4:D compand-type a-law ! voice-port 6/7:D compand-type a-law ! ! mgcp profile default !
dial-peer cor custom ! ! dial-peer voice 1 pots incoming called-number direct-inward-dial port
6/0:D ! dial-peer voice 2 pots incoming called-number direct-inward-dial port 6/3:D ! dial-peer
voice 10 pots destination-pattern 55598842304 port 6/3:D prefix 94344600 ! dial-peer voice 11
pots destination-pattern 66698842305 port 6/0:D prefix 94344600 ! dial-peer voice 3 pots
incoming called-number direct-inward-dial port 6/4:D ! dial-peer voice 4 pots incoming called-
number direct-inward-dial port 6/7:D ! dial-peer voice 12 pots destination-pattern 5551000 port
6/7:D prefix 5552000 ! dial-peer voice 13 pots destination-pattern 5552000 port 6/4:D prefix
5551000 ! ! line con 0 line aux 0 line vty 0 4 password cisco login ! scheduler allocate 10000
400 ntp master end multi-5-19#
```

故障排除

使用本部分可排除配置故障。

故障排除命令

[命令输出解释程序 \(仅限注册用户 \)](#) (OIT) 支持某些 **show** 命令。使用 OIT 可查看对 **show** 命令输出的分析。

当您排除故障ISDN中继时，您能使B信道忙碌。发出CAS中继的**ds0 busyout x**命令下面控制器配置模式。

```
Router(config-controller)#ds0 busyout X
```

为了忙碌CCS或PRI ISDN中继使用**ISDN服务b_channel x状态2**命令在接口配置模式下。

T1 :

```
Router(config)#interface serial 0:23
```

E1 :

```
Router(config)#interface serial 0:15 Router(config-if)#isdn service b_channel X state 2
```

有效状态是0=Inservice , 1=Maint , 2=Outofservice , 并且x是B信道编号在CCS和CAS配置方面。

show isdn service命令可以用于为了找到每B信道的状态。

注意：使用 **debug** 命令之前，请参阅[有关 Debug 命令的重要信息](#)。

正常ISDN和IOS转换规则调试可以用于为了排除故障TDM交换。

- **debug translation detailed** —显示关于IOS翻译规则的操作的信息，以便数字操作呼叫或呼叫号码可以是受监视。
- **debug isdn q931** - 显示关于呼叫建立及拆线、本地路由器(用户端)和网络之间的ISDN网络连接(第三层)断开的信息。

这些命令输出是**debug translation detailed**的(调试IOS的转换规则跟踪)，并且为在端口6/0的一次语音呼叫启用的**debug isdn q931**那交换到端口6/3。

```
multi-5-19#debug translation detailed *Jan 1 00:20:53.215: ISDN Se6/0:15: RX <- SETUP pd = 8
callref = 0x1D79 *Jan 1 00:20:53.215: Bearer Capability i = 0x8090A3 *Jan 1 00:20:53.215:
Channel ID i = 0xA18395 *Jan 1 00:20:53.215: Called Party Number i = 0x80, '98842304',
Plan:Unknown, Type:Unknown !--- Receive a setup message on interface 6/0:15 for a !--- speech
call with a called number of 98842304. !--- Speech call is indicated by the bearer capability of
0x8090A3 : !--- 64 Kbps A-law PCM audio/speech. !--- IOS Translation rule number 1 prepends
```

```

'555' to the original !--- called number when it passes through port 6/0. *Jan 1 00:20:53.219:
xrule_checking *Jan 1 00:20:53.219: xrule_checking calling , called 98842304 *Jan 1
00:20:53.219: xrule_checking peer_tag 0, direction 1, protocol 6 *Jan 1 00:20:53.219:
xrule_translation *Jan 1 00:20:53.219: xrule_translation callednumber 98842304, strlen 8 *Jan 1
00:20:53.219: xrule_translation callednumber 98842304 xruleCalledTag=1 *Jan 1 00:20:53.219:
xrule_translation called Callparms Numpertype 0x80, match_type 0x0 *Jan 1 00:20:53.219:
xrule_translation Xrule index 1, Numpertype 0x9 *Jan 1 00:20:53.219: dpMatchString,
target_number 98842304, match_number ^.% *Jan 1 00:20:53.219: dpMatchString match_tmp ,
match_len 0 *Jan 1 00:20:53.219: dpMatchString beginning_replace 0, match_tmp ,target 98842304
*Jan 1 00:20:53.219: dpMatchString 1. target 98842304,match_tmp *Jan 1 00:20:53.219:
dpMatchString 1.1 compare_len 0, target 98842304, match_tmp *Jan 1 00:20:53.219: dpMatchString
5. match_len=compare_len 0, target 98842304 *Jan 1 00:20:53.219: replace_string *Jan 1
00:20:53.219: replace_string match ^.%, replace 555 *Jan 1 00:20:53.219: translation_format
replace_rule ^.%, strip_proceeding 0 *Jan 1 00:20:53.219: replace_string match_tmp ^.%,
strip_proceeding 0 *Jan 1 00:20:53.219: replace_string match_tmp *Jan 1 00:20:53.219:
replace_string direction 1, callparty 2 *Jan 1 00:20:53.219: replace_string direction 1,
callparty 2, target 98842304 *Jan 1 00:20:53.219: replace_string match_tmp ,replace 555 *Jan 1
00:20:53.219: replace_string2.replacel,target98842304,current98842304,match_tmp *Jan 1
00:20:53.219: replace_string2.1 compare_len 0,match_len 0 *Jan 1 00:20:53.219: replace_string 3.
replacel , compare_len 0 *Jan 1 00:20:53.219: replace_string 4. replacel 5,compare_len -
1,replace 55 *Jan 1 00:20:53.219: replace_string 4. replacel 55,compare_len -2,replace 5 *Jan 1
00:20:53.219: replace_string 4. replacel 555,compare_len -3,replace *Jan 1 00:20:53.219:
replace_string 5.replacel 555, compare_len -3,match_len 0 *Jan 1 00:20:53.219: replace_string 6.
replacel 555,compare_len -3,current 98842304 *Jan 1 00:20:53.219: replace_string 7. replacel
5559 *Jan 1 00:20:53.219: replace_string 7. replacel 55598 *Jan 1 00:20:53.219: replace_string
7. replacel 555988 *Jan 1 00:20:53.219: replace_string 7. replacel 5559884 *Jan 1 00:20:53.219:
replace_string 7. replacel 55598842 *Jan 1 00:20:53.219: replace_string 7. replacel 555988423
*Jan 1 00:20:53.219: replace_string 7. replacel 5559884230 *Jan 1 00:20:53.219: replace_string
7. replacel 55598842304 *Jan 1 00:20:53.219: replace_string buffer 55598842304 *Jan 1
00:20:53.219: xrule_translation index 1,xrule_number 55598842304, callparty 2 *Jan 1
00:20:53.219: xrule_translation Return rc = 0 *Jan 1 00:20:53.219: xrule_checking Return rc = 0
*Jan 1 00:20:53.223: ISDN Se6/0:15: TX -> CALL_PROC pd = 8 callref = 0x9D79 *Jan 1 00:20:53.223:
Channel ID i = 0xA98395 !--- Send a call proceeding back to the ISDN. *Jan 1 00:20:53.227: ISDN
Se6/3:15: TX -> SETUP pd = 8 callref = 0x0005 *Jan 1 00:20:53.227: Bearer Capability i =
0x8090A3 *Jan 1 00:20:53.227: Channel ID i = 0xA9839F *Jan 1 00:20:53.227: Called Party Number i
= 0x80, '0401890165', Plan:Unknown, Type:Unknown !--- Match has been made on outgoing POTS dial-
peer !--- and a new call is sent out on 6/3:15. *Jan 1 00:20:53.371: ISDN Se6/3:15: RX <-
CALL_PROC pd = 8 callref = 0x8005 *Jan 1 00:20:53.371: Channel ID i = 0xA1839F *Jan 1
00:20:53.371: ISDN Se6/3:15: RX <- ALERTING pd = 8 callref = 0x8005 !--- Receive alerting on the
second (outgoing) call leg. *Jan 1 00:20:53.375: ISDN Se6/0:15: TX -> ALERTING pd = 8 callref =
0x9D79 *Jan 1 00:20:53.375: Progress Ind i = 0x8188 - In-band info or appropriate now available
!--- Send alerting on the first (incoming) call leg. *Jan 1 00:21:00.095: ISDN Se6/3:15: RX <-
CONNECT pd = 8 callref = 0x8005 *Jan 1 00:21:00.095: ISDN Se6/3:15: TX -> CONNECT_ACK pd = 8
callref = 0x0005 *Jan 1 00:21:00.099: ISDN Se6/0:15: TX -> CONNECT pd = 8 callref = 0x9D79 *Jan
1 00:21:00.247: ISDN Se6/0:15: RX <- CONNECT_ACK pd = 8 callref = 0x1D79 !--- Both calls
connect. *Jan 1 00:21:00.247: ISDN Se6/0:15: CALL_PROGRESS:CALL_CONNECTED call id 0x5, bchan 20,
dsl0 *Jan 1 00:21:37.591: ISDN Se6/0:15: RX <- DISCONNECT pd = 8 callref = 0x1D79 *Jan 1
00:21:37.591: Cause i = 0x8290 - Normal call clearing !--- Receive a disconnect on incoming call
leg. *Jan 1 00:21:37.595: ISDN Se6/0:15: TX -> RELEASE pd = 8 callref = 0x9D79 *Jan 1
00:21:37.599: ISDN Se6/3:15: TX -> DISCONNECT pd = 8 callref = 0x0005 *Jan 1 00:21:37.599: Cause
i = 0x8090 - Normal call clearing !--- Send a disconnect on the outgoing call leg. *Jan 1
00:21:37.631: ISDN Se6/0:15: RX <- RELEASE_COMP pd = 8 callref = 0x1D79 *Jan 1 00:21:37.723:
ISDN Se6/3:15: RX <- RELEASE pd = 8 callref = 0x8005 *Jan 1 00:21:37.723: Cause i = 0x8290 -
Normal call clearing *Jan 1 00:21:37.723: ISDN Se6/3:15: TX -> RELEASE_COMP pd = 8 callref =
0x0005 !--- Both calls have cleared.

```

这是从debug isdn q931命令的命令输出。这些跟踪显示ISDN数据呼叫交换的从端口6/4到端口6/7。

```

Jun 19 13:36:02.091: ISDN Se6/4:15: RX <- SETUP pd = 8 callref = 0x0005
Jun 19 13:36:02.091: Bearer Capability i = 0x8890
Jun 19 13:36:02.091: Channel ID i = 0xA9839F
Jun 19 13:36:02.095: Called Party Number i = 0x81, '5551000', Plan:ISDN, Type:Unknown
!--- Call comes in on port 6/4 for 5551000. Bearer Capability !--- is 0x8890, which indicates
64 K data call. Jun 19 13:36:02.095: ISDN Se6/4:15: TX -> CALL_PROC pd = 8 callref = 0x8005 Jun

```

19 13:36:02.095: Channel ID i = 0xA9839F Jun 19 13:36:02.099: ISDN Se6/7:15: TX -> SETUP pd = 8 callref = 0x0085 Jun 19 13:36:02.099: Bearer Capability i = 0x8890 Jun 19 13:36:02.099: Channel ID i = 0xA98381 Jun 19 13:36:02.099: Called Party Number i = 0x81, '5552000', Plan:ISDN, Type:Unknown *!--- Redirect the call out on port 6/7, (new) called !--- number is 5552000 with data bearer capability.* Jun 19 13:36:02.155: ISDN Se6/7:15: RX <- CALL_PROC pd = 8 callref = 0x8085 Jun 19 13:36:02.155: Channel ID i = 0xA98381 Jun 19 13:36:02.159: ISDN Se6/7:15: RX <- CONNECT pd = 8 callref = 0x8085 Jun 19 13:36:02.159: Channel ID i = 0xA98381 *!--- Second call leg connects.* Jun 19 13:36:02.159: ISDN Se6/7:15: TX -> CONNECT_ACK pd = 8 callref = 0x0085 Jun 19 13:36:02.163: ISDN Se6/4:15: CALL_PROGRESS:CALL_CONNECTED call id 0x7,bchan 30, dsl 2 Jun 19 13:36:02.163: ISDN Se6/4:15: TX -> CONNECT pd = 8 callref = 0x8005 *!--- First call leg connects.* Jun 19 13:36:02.215: ISDN Se6/4:15: RX <- CONNECT_ACK pd = 8 callref = 0x0005 Jun 19 13:38:12.783: ISDN Se6/4:15: RX <- DISCONNECT pd = 8 callref = 0x0005 Jun 19 13:38:12.783: Cause i = 0x8090 - Normal call clearing *!--- Remote device drops the call, first call leg disconnects.* Jun 19 13:38:12.787: ISDN Se6/4:15: TX -> RELEASE pd = 8 callref = 0x8005 Jun 19 13:38:12.787: ISDN Se6/7:15: TX -> DISCONNECT pd = 8 callref = 0x0085 Jun 19 13:38:12.787: Cause i = 0x8290 - Normal call clearing *!--- Second call leg is dropped.* Jun 19 13:38:12.807: ISDN Se6/7:15: RX <- RELEASE pd = 8 callref = 0x8085 Jun 19 13:38:12.851: ISDN Se6/4:15: RX <- RELEASE_COMP pd = 8 callref = 0x0005 *!--- Both calls have cleared.*

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