

从 Microsoft Windows 客户端发起的异步多链路 PPP 拨号

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简介

在此异步多链路PPP配置中，远程拨入用户用Microsoft Windows 95/98增加接入速率联机的仅供PC使用多个调制解调器。异步多链路PPP可能也配置与其他客户端，例如Linux和麦金塔电脑，与适当的客户端PPP软件。路由器的配置多链路PPP的对立于客户端PC平台。

先决条件

要求

本文档没有任何特定的要求。

使用的组件

本文档中的信息基于以下软件和硬件版本。

- 运行Cisco IOS软件版本12.07(T)的Cisco AS5300。

本文档中的信息都是基于特定实验室环境中的设备创建的。本文档中使用的所有设备最初均采用原始（默认）配置。如果您是在真实网络上操作，请确保您在使用任何命令前已经了解其潜在影响。

规则

有关文档规则的详细信息，请参阅 [Cisco 技术提示规则](#)。

背景理论

多链路PPP (MPPP)允许设备发送数据到在多点的同一个目的地通过实现虚链路指向数据链路。MPPP连接有最大带宽相等与链路成员的带宽的总和。MPPP可以配置为复用的链路，例如ISDN和帧中继，或者为多条异步线路。

异步多链路PPP比那可以用于以更快的速度联络远程客户端可用通过单个模拟连接。在异步MPPP，远程客户端使用多个调制解调器并且多条电话线，对拨入到中央路由器并且访问网络。由于多条电话线比ISDN基本速率接口(BRI)服务经常便宜，异步MPPP提供一有效方式增加远程用户的连接速度，当控制开销时。异步MPPP也是获取不可能由ISDN服务的远程区域的更高的接入速率有效方式。

异步MPPP一起捆绑对接入服务器的单独的调制解调器连接。在每对等体的PPP软件分段数据包并且传达片段给另一侧通过多个模拟连接。接收端根据在他们内被嵌入的PPP数据采集从独立的连接的数据包，并且，重新召集片段到有效数据包，因而供给一条端到端虚拟链路高带宽。异步MPPP可以配置在两路由器之间或在路由器和客户端PC之间。

虽然使用超过两调制解调器从客户端PC的多链路连接是可能的，从在PC的能否定所有额外的带宽被获取的数据包分段和重组的结果的开销。

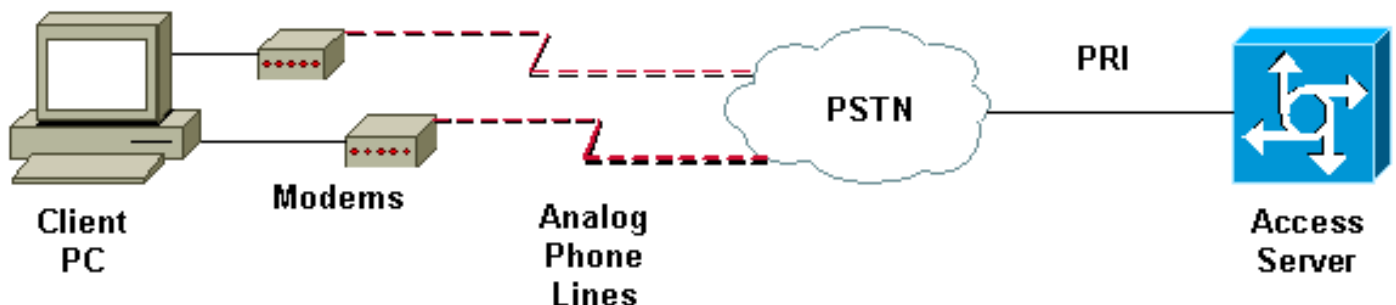
配置

本部分提供有关如何配置本文档所述功能的信息。

注意：要查找本文档所用命令的其他信息，请使用[命令查找工具](#)（[仅限注册用户](#)）。

网络图

本文档使用此图中所示的网络设置：



NAS 配置

在此配置中，有T1主速率接口连接的一个AS5300服务器使用作为模拟用户拨入网络接入服务器 (NAS)。由于在此的其他T1控制器都NAS没有配置，此接入服务器完全使用异步拨号。此AS5300配置使用虚拟模板克隆呼入呼叫的虚拟访问接口。多链路PPP捆绑复制其从虚拟模板定义的接口参数。

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一些基本认证，授权和核算(AAA)命令包括作为最佳实践方法示例。用户名和密码拨入用户的在路由器配置。IP地址分配到拨入用户从地址池提供。

Cisco AS5300

```
bobslake-nas-01#show running-config
Building configuration...

Current configuration:
!
! Last configuration change at 16:01:01 UTC Wed Jun 28
2000
! NVRAM config last updated at 15:30:28 UTC Wed Jun 28
2000
!
version 12.0
service timestamps debug datetime msec localtime show-
timezone
service timestamps log datetime msec localtime show-
timezone
service password-encryption
service tcp-small-servers
!
hostname bobslake-nas-01
!
logging buffered 10000 debugging
aaa new-model
aaa authentication login default local
aaa authentication ppp default if-needed local
!--- authenticate for PPP if not authenticated during
login !--- allows users with Terminal Window after Dial
to initiate PPP! username admin password <deleted>
username charlie password <deleted> spe 1/0 1/7 firmware
location system:/ucode/mica_port_firmware ! resource-
pool disable ! ip subnet-zero no ip source-route ip
domain-name the.net ! multilink virtual-template 1
!--- use virtual-template 1 for multilink connections
async-bootp dns-server 172.22.53.210 isdn switch-type
primary-5ess isdn voice-call-failure 0 ! controller T1 0
framing esf clock source line primary linecode b8zs pri-
group timeslots 1-24 ! controller T1 1 framing esf
linecode b8zs pri-group timeslots 1-24 ! controller T1 2
framing esf linecode b8zs pri-group timeslots 1-24 !
controller T1 3 framing esf clock source line secondary
3 linecode b8zs pri-group timeslots 1-24 ! interface
Loopback0 ip address 172.21.10.10 255.255.255.255 no ip
directed-broadcast ! interface Loopback1
ip address 172.21.104.254 255.255.255.0
!--- summarizes addresses in address pool !--- Loopback
1 is in the same subnet as the address pool no ip
directed-broadcast ! interface Ethernet0 no ip address
no ip directed-broadcast shutdown ! interface Virtual-
Templatel
description Template for Multilink Users
ip unnumbered Loopback0
no ip directed-broadcast
peer default ip address pool addr-pool
!--- use IP pool called addr-pool !--- for incoming
calls

ppp authentication chap
!--- authenticate using Challenge Handshake
```

```

Authentication Protocol (CHAP) ppp multilink
!
!--- configure D channel on PRI interface Serial0:23
description Headquarters 324-1939 active PRI line no ip
address no ip directed-broadcast isdn switch-type
primary-5ess isdn incoming-voice modem fair-queue 64 256
0 no cdp enable ! interface Serial1:23 no ip address no
ip directed-broadcast no logging event link-status no
snmp trap link-status isdn switch-type primary-5ess isdn
incoming-voice modem fair-queue 64 256 0 no cdp enable !
interface Serial2:23 no ip address no ip directed-
broadcast no logging event link-status no snmp trap
link-status isdn switch-type primary-5ess isdn incoming-
voice modem fair-queue 64 256 0 no cdp enable !
interface Serial3:23 no ip address no ip directed-
broadcast no logging event link-status no snmp trap
link-status isdn switch-type primary-5ess isdn incoming-
voice modem fair-queue 64 256 0 no cdp enable !
interface FastEthernet0 ip address 172.21.101.23
255.255.255.0 no ip directed-broadcast duplex auto speed
auto ! interface Group-Async1
!--- template to control all async interface
configuration ip unnumbered Loopback0 no ip directed-
broadcast encapsulation ppp
!--- use PPP encapsulation dialer in-band dialer-group 5
async mode interactive peer default ip address pool
addr-pool
!--- use IP pool called addr-pool !--- for incoming
calls

no fair-queue
no cdp enable
ppp authentication chap callin
!--- CHAP authenticate for dialin users only ppp
multilink
group-range 1 48
!--- assign modems 1-48 to the Group-Async 1
configuration template router eigrp 1 network 172.21.0.0
! ip local pool addr-pool 172.21.104.1 172.21.104.48
!--- define IP address pool range for dialin clients ip
classless no ip http server ! access-list 105 permit ip
any any dialer-list 5 protocol ip list 105 ! line con 0
exec-timeout 0 0 transport input none line 1 48
autoselect during-login
!--- permits user login prompts after dialin autoselect
ppp
!--- automatically launch PPP on the line modem InOut
!--- modems can be used to dialin and dialout !--- InOut
may be replaced by Dialin !--- if NAS handles only
incoming calls

transport preferred none
transport output telnet
line aux 0
line vty 0 4
transport preferred none
transport input telnet
transport output telnet
!
ntp clock-period 17180374
ntp update-calendar
ntp server 172.22.255.1 prefer
end

```

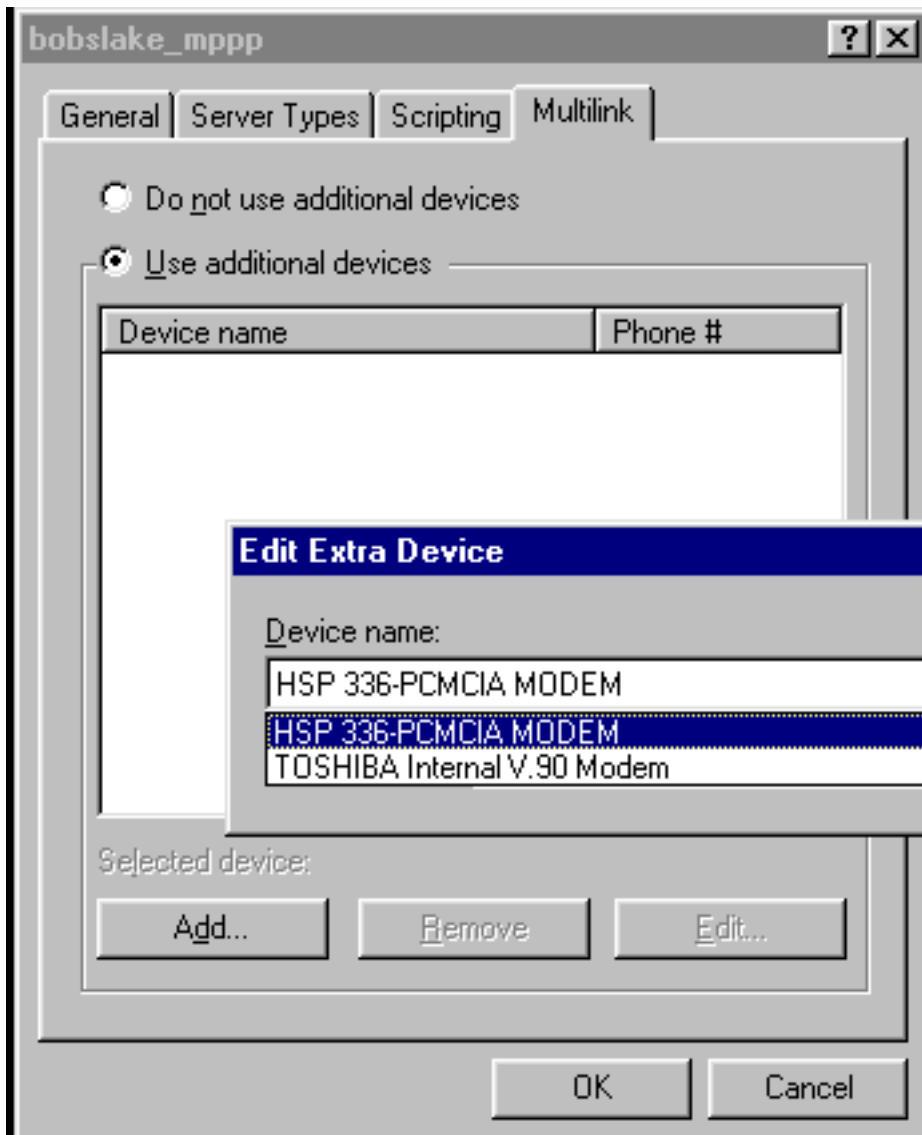
配置 Windows 9x 客户端

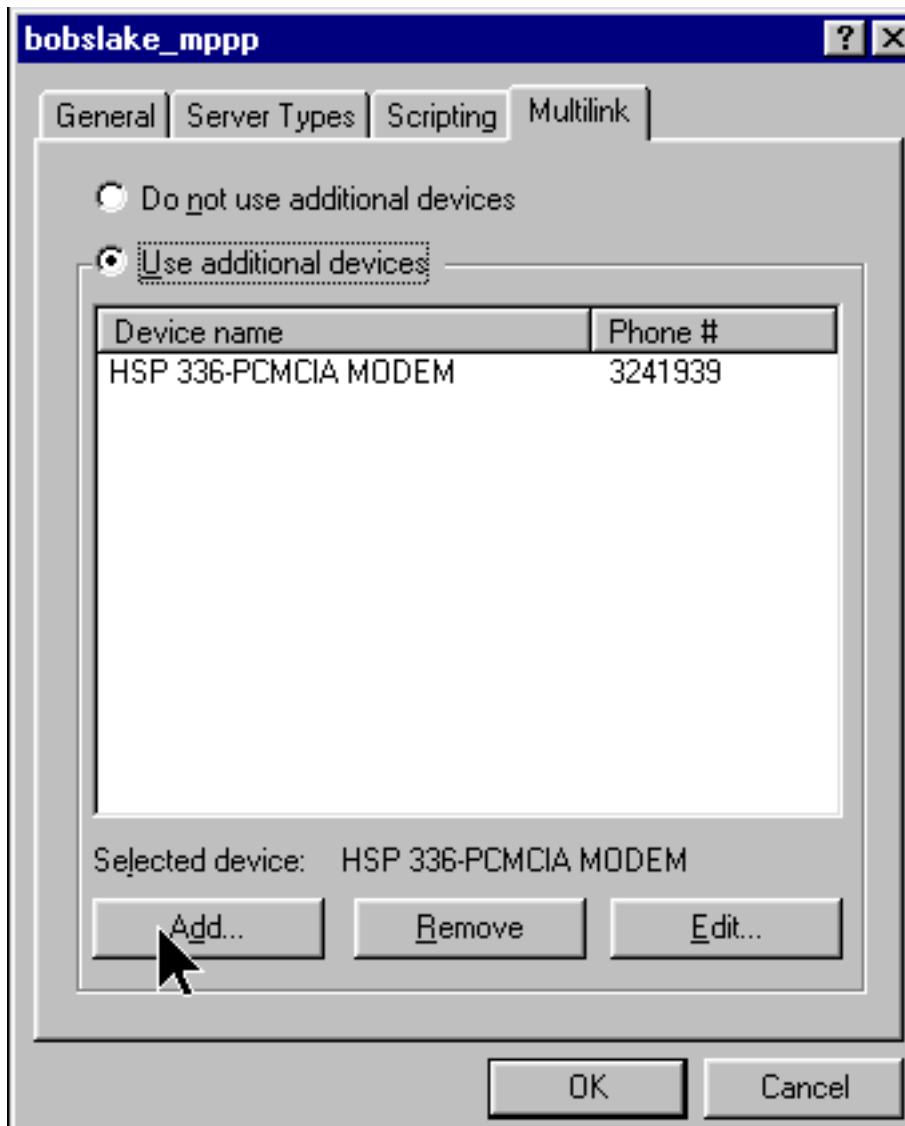
以下步骤是在配置您的Windows 9x客户端的概述MPPP的。如果有困难，参考[Microsoft网站](#)。

为了配置MPPP的Microsoft Windows 9x客户端，请确保您安排拨号网络版本1.3或以上安装。

去到[Microsoft网站](#) 欲知更多信息和下载拨号网络(DUN)新版本。

1. 分开连接并且配置每个调制解调器。从Windows控制面板，请使用" Add New Hardware "程序添加调制解调器给客户端。如果有添加调制解调器的麻烦，与您的PC供应商或Microsoft联系故障排除程序的。验证每个调制解调器正确地连接和由操作系统认可。您可以要使用终端仿真器验证您的调制解调器适当地运作。
2. 创建新的拨号连接。在Windows请双击“我的计算机”图标并且导航对“拨号联网”。其次，双击“Make New Connection”。使用主调制解调器，跟随方向创建拨号连接。多链路功能配置的以后。通过拨号测试连接对您的服务提供商。
3. 添加多链路功能到您的拨号连接。双击“我的计算机”图标并且导航对“拨号联网”。用鼠标右键单击设置的连接图标。从出现的菜单，请选择"Properties."点击“多链路”选项卡，选择"Use additional devices , "并且点击“添加”按钮。选择从下拉菜单的一个另外的调制解调器并且输入接入服务器的仅七个位电话号码或者接受显示的号码。请勿包括区域代码，当配置附加设备时，即使它是长途呼叫。连接自动地使用配置的区域代码第一个调制解调器。两次点击"OK"完成设置。这是Windows多链路配置的一些屏幕截图





- 首次对接入服务器的调制解调器连接。双击创建的拨号连接图标。输入在路由器配置的用户名和密码，然后点击"Connect"按钮。拨号网络将拨号为主调制解调器配置的号码指定为连接。当第一个连接设立时，拨号网络拨号使用在Additional Devices列表指定的另外的调制解调器。当所有连接被建立时，您能或者通过双击查看关于链路的状态信息在任务栏显示的“通信计算机”图标，或者您可以断开连接。点击"Details"验证连接使用多个设备。当您选择在列表框时的一个设备，挂起或恢复按钮出现。如果挂起按钮出现，设备当前是在使用中和“捆绑”到多链路连接。单击在“挂起”按钮断开该线路并且从捆绑连接删除线路。如果“恢复”按钮出现，请点击它拨号该连接和添加该线路到套件。您能动态地暂停和恢复多链路，无需切连接。

验证

当前没有可用于此配置的验证过程。

本部分所提供的信息可用于确认您的配置是否正常工作。

输出解释器工具支持某些 **show** 命令（只限于注册用户），通过它可以查看 **show** 命令输出的分析。

- **show ppp multilink** - 显示处于启用状态下的多链路捆绑的信息。应使用本命令来检查多链路连接。
- **show caller** - 显示NAS上的个人用户以及所消耗的资源的信息。本命令显示大量连接池中的的

Active的呼叫统计信息，并显示各用户的绝对时间以及空闲时间。

- show caller user - 显示特定用户（例如使用TTY线路的用户）的参数、异步接口（机架/插槽/端口）、DS0信道编号、调制解调器编号、所分配的IP地址、PPP与PPP捆绑参数等等。

在验证和排除故障MPPP连接的协助，参考这些建议：

- 保证前缀，例如使用9在拨号外线前，在客户端PC正确地配置。如果这没有适当地配置，您将听到占线信号，当编号启动拨号。
- 创建每个调制解调器的独立的DUN客户端并且验证您有全连接对您的服务提供商。在继续进行分开请使用每个调制解调器排除故障前您的多链路连接。
- 请使用一部终端仿真器连接到调制解调器。使用atdt命令，拨号NAS的编号。例如，在超级终端回车atdt 55511111。验证调制解调器正确地拨号并且连接对NAS。如果调制解调器不连接，请排除故障您的调制解调器。请参阅在Microsoft网站的[使用的](#)基本AT调制解调器命令文档关于故障排除客户端调制解调器的更多信息。
- 如果您的主要连接正确连接，但是第二拨号连接给占线信号，请验证另外的调制解调器的电话号码在DUN正确地配置。切记，区域代码不应该添加到另外的设备的配置。参考在上面[配置的Windows 9x客户端](#)部分的配置步骤。

[show 和 debug 输出示例](#)

这是一些显示和从AS5300的debug输出。调试的部分为简要起见删除。注意在输出和备注中的粗体部分。

注意呼叫方在Async5和Async6连接在验证之后。临时IP地址提供给从地址池的呼叫方。呼叫然后虚拟化或附加对一个现有虚拟捆绑。这是因为接入服务器需要知道谁呼叫方是确定他们是否属于一个已建立虚拟捆绑。一旦呼叫方附加对套件，临时IP地址删除，并且呼叫方使用虚拟捆绑的IP地址。

```
bobslake-nas-01#
bobslake-nas-01#show ppp multilink

Virtual-Access1, bundle name is charlie
 0 lost fragments, 0 reordered, 0 unassigned, sequence 0x29/0x17 rcvd/sent
 0 discarded, 0 lost received, 1/255 load
Member links: 2 (max not set, min not set)
  Async5
  Async6

!--- Note that the bundle is using Async line 5 and 6 for multilink. bobslake-nas-01#show caller

Line           User           Service        Active   Idle
con 0          admin          Host connect   1w4d    16:50:19
tty 5        charlie        Async          00:04:34 00:01:54
tty 6        charlie        Async          00:02:00 00:00:57
vty 1          admin          VTY            00:13:43 00:00:00
As5         charlie        PPP            00:04:25 00:00:00
As6         charlie        PPP            00:01:53 00:00:00
Vi1         charlie        PPP Bundle    00:04:25 00:00:57

!--- User charlie has two async lines, two tty, !--- and one virtual interface bundle. bobslake-
nas-01#show caller user charlie

User: charlie, line tty 5, service Async
!--- shows hardware level settings for user charlie (first connection) Active time 00:04:43,
Idle time 00:00:06 Timeouts: Absolute Idle Idle Session Exec Limits: - - 00:10:00 Disconnect in:
- - - TTY: Line 5, running PPP on As5
!--- user charlie is using tty 5 DS0: (slot/unit/channel)=0/0/0 Line: Baud rate (TX/RX) is
```


115200/115200, no parity, 1 stopbits, 8 databits Status: Ready, Active, No Exit Banner, Async Interface Active HW PPP Support Active Capabilities: Hardware Flowcontrol In, Hardware Flowcontrol Out Modem Callout, Modem RI is CD, Line usable as async interface, Integrated Modem Modem State: Ready **User: charlie, line tty 6, service Async**

!--- shows hardware level settings for user charlie (second connection) Active time 00:02:09, Idle time 00:01:06 Timeouts: Absolute Idle Idle Session Exec Limits: - - 00:10:00 Disconnect in: - - - **TTY: Line 6, running PPP on As6**

!--- user charlie is using tty 6 DS0: (slot/unit/channel)=0/0/1
Line: Baud rate (TX/RX) is 115200/115200, no parity, 1 stopbits, 8 databits
Status: Ready, Active, No Exit Banner, Async Interface Active
HW PPP Support Active
Capabilities: Hardware Flowcontrol In, Hardware Flowcontrol Out
Modem Callout, Modem RI is CD,
Line usable as async interface, Integrated Modem
Modem State: Ready

User: charlie, line As5, service PPP

!--- PPP setting for user charlie (first connection). Active time 00:04:34, Idle time 00:00:00 Timeouts: Absolute Idle Limits: - - Disconnect in: - - **PPP: LCP Open, multilink Open, CHAP (<-AAA)**

!--- MPPP state is open. Dialer: Connected, inbound Type is IN-BAND ASYNC, group Async5 IP: Local 172.21.10.10 Bundle: Member of charlie, last input 00:00:00 Counts: 54 packets input, 4110 bytes, 0 no buffer 1 input errors, 1 CRC, 0 frame, 0 overrun 73 packets output, 4150 bytes, 0 underruns 0 output errors, 0 collisions, 0 interface resets *!--- Packets are passing through the connection.* **User: charlie, line As6, service PPP**

!--- PPP setting for user charlie (second connection). Active time 00:02:02, Idle time 00:00:00 Timeouts: Absolute Idle Limits: - - Disconnect in: - - **PPP: LCP Open, multilink Open, CHAP (<-AAA)**

!--- MPPP state is Open. Dialer: Connected, inbound Type is IN-BAND ASYNC, group Async6 IP: Local 172.21.10.10 Bundle: Member of charlie, last input 00:00:00 Counts: 6 packets input, 462 bytes, 0 no buffer 1 input errors, 1 CRC, 0 frame, 0 overrun 20 packets output, 1129 bytes, 0 underruns 0 output errors, 0 collisions, 0 interface resets *!--- Packets are passing through the connection.* **User: charlie, line Vi1, service PPP Bundle**

!--- Bundle information for user charlie Active time 00:04:34, Idle time 00:00:06 Timeouts: Absolute Idle Limits: - - Disconnect in: - - **PPP: LCP Open, multilink Open, IPCP**
IP: Local 172.21.104.254, remote 172.21.104.2

!--- Remote IP address is obtained from IP pool. Counts: 50 packets input, 4034 bytes, 0 no buffer 0 input errors, 0 CRC, 0 frame, 0 overrun 80 packets output, 8750 bytes, 0 underruns 0 output errors, 0 collisions, 0 interface resets **bobslake-nas-01#debug vtemplate**

Virtual Template debugging is on

bobslake-nas-01#debug ppp multilink events

Multilink events debugging is on

bobslake-nas-01#debug ppp negotiation

PPP protocol negotiation debugging is on

bobslake-nas-01#debug ppp authentication

PPP authentication debugging is on

bobslake-nas-01#debug ppp error

PPP protocol errors debugging is on

bobslake-nas-01#debug modem

Modem control/process activation debugging is on

bobslake-nas-01#show debug

General OS:

Modem control/process activation debugging is on

PPP:

PPP authentication debugging is on

PPP protocol errors debugging is on

PPP protocol negotiation debugging is on

Multilink events debugging is on

VTEMPLATE:

Virtual Template debugging is on

bobslake-nas-01#

Jun 28 15:41:46.281 UTC: TTY5: **DSR came up**
Jun 28 15:41:46.281 UTC: tty5: Modem: IDLE->(unknown)
!--- Modem responds to first dialin connection. Jun 28 15:41:46.281 UTC: TTY5: EXEC creation
... Jun 28 15:41:48.537 UTC: TTY5 **Autoselect cmd: ppp negotiate**
Jun 28 15:41:48.537 UTC: TTY5: EXEC creation
...
Jun 28 15:41:48.545 UTC: As5 IPCP: **Install route to 172.21.104.4**
!--- IP address for first link obtained from address pool. !--- Route will be removed when link is virtualized later. Jun 28 15:41:50.541 UTC: As5 PPP: Treating connection as a callin Jun 28 15:41:50.541 UTC: As5 PPP: Phase is ESTABLISHING, Passive Open Jun 28 15:41:50.541 UTC: **As5 LCP: State is Listen**
!--- LCP negotiation begins. Jun 28 15:41:51.549 UTC: As5 LCP: I CONFREQ [Listen] id 3 len 46
... Jun 28 15:41:51.549 UTC: Unthrottle 5 Jun 28 15:41:51.549 UTC: As5 LCP: O CONFREQ [Listen] id 1 len 47 ... Jun 28 15:41:51.549 UTC: As5 LCP: O CONFREQ [Listen] id 3 len 7 ... Jun 28 15:41:53.549 UTC: As5 LCP: O CONFREQ [REQsent] id 2 len 47 Jun 28 15:41:53.549 UTC: As5 LCP: ACCM 0x000A0000 (0x0206000A0000) Jun 28 15:41:53.549 UTC: As5 LCP: AuthProto CHAP (0x0305C22305) Jun 28 15:41:53.549 UTC: As5 LCP: MagicNumber 0x56E3C73E (0x050656E3C73E) Jun 28 15:41:53.549 UTC: As5 LCP: PFC (0x0702) Jun 28 15:41:53.549 UTC: As5 LCP: ACFC (0x0802) **Jun 28 15:41:53.549 UTC: As5 LCP: MRRU 1524 (0x110405F4)**
!--- Max-Receive-Reconstructed-Unit:Maximum packet size !--- that the peer will reconstruct. !--- Both sides must agree on the packet size (MRRU). Jun 28 15:41:53.549 UTC: As5 LCP: EndpointDisc 1 Local Jun 28 15:41:53.549 UTC: As5 LCP: (0x131201626F62736C616B652D6E61732D) Jun 28 15:41:53.549 UTC: As5 LCP: (0x3031) Jun 28 15:41:53.789 UTC: As5 LCP: I CONFACK [REQsent] id 2 len 47 Jun 28 15:41:53.789 UTC: As5 LCP: ACCM 0x000A0000 (0x0206000A0000) Jun 28 15:41:53.789 UTC: As5 LCP: AuthProto CHAP (0x0305C22305) Jun 28 15:41:53.789 UTC: As5 LCP: MagicNumber 0x56E3C73E (0x050656E3C73E) Jun 28 15:41:53.789 UTC: As5 LCP: PFC (0x0702) Jun 28 15:41:53.789 UTC: As5 LCP: ACFC (0x0802) **Jun 28 15:41:53.789 UTC: As5 LCP: MRRU 1524 (0x110405F4)**
!--- Max-Receive-Reconstructed-Unit:Maximum packet size that !--- the peer will reconstruct. Jun 28 15:41:53.789 UTC: As5 LCP: EndpointDisc 1 Local Jun 28 15:41:53.789 UTC: As5 LCP: (0x131201626F62736C616B652D6E61732D) Jun 28 15:41:53.789 UTC: As5 LCP: (0x3031) Jun 28 15:41:54.541 UTC: As5 LCP: I CONFREQ [ACKrcvd] id 4 len 46 ... Jun 28 15:41:54.541 UTC: As5 LCP: O CONFREQ [ACKrcvd] id 4 len 7 ... Jun 28 15:41:54.717 UTC: As5 LCP: I CONFREQ [ACKrcvd] id 5 len 43 ... Jun 28 15:41:54.717 UTC: As5 LCP: O CONFACK [ACKrcvd] id 5 len 43 ... Jun 28 15:41:54.721 UTC: As5 **LCP: State is Open**
!--- LCP negotiation is complete. Jun 28 15:41:54.721 UTC: As5 PPP: Phase is AUTHENTICATING, by this end *!--- CHAP authentication begins.* Jun 28 15:41:54.721 UTC: As5 CHAP: O CHALLENGE id 1 len 36 from "bobslake-nas-01" Jun 28 15:41:54.909 UTC: As5 CHAP: I RESPONSE id 1 len 27 from "charlie" Jun 28 15:41:54.909 UTC: As5 **CHAP: O SUCCESS** id 1 len 4
!--- CHAP authentication is successful. Jun 28 15:41:54.909 UTC: As5 MLP: Multilink up event pending Jun 28 15:41:54.913 UTC: As5 PPP: **Phase is VIRTUALIZED**
!--- Call is virtualized after authentication. Jun 28 15:41:54.913 UTC: Vi1 VTEMPLATE: Reuse Vi1, recycle queue size 0 Jun 28 15:41:54.913 UTC: Vi1 VTEMPLATE: Hardware address 0010.7b4d.7046 Jun 28 15:41:54.913 UTC: Vi1 PPP: Phase is DOWN, Setup Jun 28 15:41:54.913 UTC: Vi1 MLP: VP: Clone from Vtemplate 1 block=1 Jun 28 15:41:54.913 UTC: Vi1 VTEMPLATE: Has a new cloneblk vtemplate Jun 28 15:41:54.913 UTC: Vi1 VTEMPLATE: ***** CLONE VACCESS1 ***** Jun 28 15:41:54.913 UTC: **Vi1 VTEMPLATE: Clone from Virtual-Templatel**
!--- Cloning from Virtual-Template. interface Virtual-Access1 default ip address no ip address encaps ppp description Template for Multilink Users ip unnumbered Loopback0 no ip directed-broadcast no logging event link-status no snmp trap link-status peer default ip address pool addr-pool ppp authentication chap ppp multilink ip unnum loop 1 end Jun 28 15:41:55.005 UTC: Vi1 PPP: Treating connection as a dedicated line Jun 28 15:41:55.005 UTC: Vi1 PPP: Phase is ESTABLISHING, Active Open Jun 28 15:41:55.005 UTC: Vi1 LCP: O CONFREQ [Closed] id 1 len 37 ... Jun 28 15:41:55.009 UTC: Vi1 PPP: Phase is UP Jun 28 15:41:55.009 UTC: Vi1 IPCP: O CONFREQ [Closed] id 1 len 10 Jun 28 15:41:55.009 UTC: Vi1 IPCP: Address 172.21.104.254 (0x0306AC1568FE) Jun 28 15:41:55.009 UTC: **As5 MLP: charlie, multilink up, first link**
!--- First link in multilink bundle for user charlie is up. Jun 28 15:41:55.009 UTC: As5 IPCP: **Remove route to 172.21.104.4**
!--- Temporary route to first link removed since link is virtualized. Jun 28 15:41:55.069 UTC: Vi1 IPCP: I CONFREQ [REQsent] id 1 len 40 ... Jun 28 15:41:55.069 UTC: Vi1 IPCP: **Pool returned 172.21.104.2**
!--- IP address for virtual bundle obtained from address pool. Jun 28 15:41:55.069 UTC: Vi1 IPCP: O CONFREQ [REQsent] id 1 len 22 ... Jun 28 15:41:55.085 UTC: Vi1 CCP: I CONFREQ [Not negotiated] id 1 len 15 Jun 28 15:41:55.085 UTC: Vi1 CCP: MS-PPC supported bits 0x00000001 (0x120600) ... Jun 28 15:41:55.181 UTC: Vi1 IPCP: I CONFACK [REQsent] id 1 len 10 Jun 28

```
15:41:55.181 UTC: Vi1 IPCP: Address 172.21.104.254 (0x0306AC1568FE) Jun 28 15:41:57.009 UTC: Vi1
IPCP: TIMEOUT: State ACKrcvd Jun 28 15:41:57.009 UTC: Vi1 IPCP: O CONFREQ [ACKrcvd] id 2 len 10
Jun 28 15:41:57.009 UTC: Vi1 IPCP: Address 172.21.104.254 (0x0306AC1568FE) Jun 28 15:41:59.009
UTC: Vi1 IPCP: TIMEOUT: State REQsent Jun 28 15:41:59.009 UTC: Vi1 IPCP: O CONFREQ [REQsent] id
3 len 10 Jun 28 15:41:59.009 UTC: Vi1 IPCP: Address 172.21.104.254 (0x0306AC1568FE) Jun 28
15:41:59.617 UTC: Vi1 IPCP: I CONFREQ [REQsent] id 2 len 34 ... Jun 28 15:41:59.617 UTC: Vi1
IPCP: O CONFREQ [REQsent] id 2 len 16 ... Jun 28 15:41:59.633 UTC: Vi1 PPP: Replace IPCP code 2
id 3 with id 3 Jun 28 15:41:59.633 UTC: Vi1 IPCP: I CONFACK [REQsent] id 3 len 10 Jun 28
15:41:59.633 UTC: Vi1 IPCP: Address 172.21.104.254 (0x0306AC1568FE) Jun 28 15:41:59.777 UTC: Vi1
IPCP: I CONFREQ [ACKrcvd] id 3 len 22 ... Jun 28 15:41:59.777 UTC: Vi1 IPCP: O CONFNAK [ACKrcvd]
id 3 len 22 ... Jun 28 15:41:59.937 UTC: Vi1 IPCP: I CONFREQ [ACKrcvd] id 4 len 22 Jun 28
15:41:59.937 UTC: Vi1 IPCP: Address 172.21.104.2
(0x0306AC156802)
!--- IP address of virtual bundle was previously obtained from !--- address pool. Jun 28
15:41:59.937 UTC: Vi1 IPCP: PrimaryDNS 172.22.53.210 (0x8106AC1635D2) Jun 28 15:41:59.937 UTC:
Vi1 IPCP: SecondaryDNS 171.68.10.70 (0x8306AB440A46) Jun 28 15:41:59.937 UTC: Vi1 IPCP: O
CONFACK [ACKrcvd] id 4 len 22 Jun 28 15:41:59.937 UTC: Vi1 IPCP: Address 172.21.104.2
(0x0306AC156802) Jun 28 15:41:59.937 UTC: Vi1 IPCP: PrimaryDNS 172.22.53.210 (0x8106AC1635D2)
Jun 28 15:41:59.937 UTC: Vi1 IPCP: SecondaryDNS 171.68.10.70 (0x8306AB440A46) Jun 28
15:41:59.937 UTC: Vi1 IPCP: State is Open Jun 28 15:41:59.941 UTC: Vi1 IPCP: Install route to
172.21.104.2 !--- Add route for virtual bundle to routing table. Jun 28 15:42:44.383 UTC: TTY51:
timer type 1 expired Jun 28 15:42:44.383 UTC: TTY51: Exec timer (continued) !--- Modem comes up
for multilink connection. Jun 28 15:44:20.385 UTC: TTY6: DSR came up
!--- Async 6 is used for second connection. Jun 28 15:44:20.385 UTC: tty6: Modem: IDLE-
>(unknown) Jun 28 15:44:20.385 UTC: TTY6: EXEC creation ... Jun 28 15:44:20.529 UTC: TTY6
Autoselect cmd: ppp negotiate Jun 28 15:44:20.529 UTC: TTY6: EXEC creation ...Jun 28
15:44:20.661 UTC: As6 IPCP: Install route to 172.21.104.5
!--- IP address for second link is obtained from the pool. !--- Route will be removed when link
is added to the MPPP bundle. Jun 28 15:44:22.661 UTC: As6 PPP: Treating connection as a callin
Jun 28 15:44:22.661 UTC: As6 PPP: Phase is ESTABLISHING, Passive Open !--- LCP negotiation
begins. Jun 28 15:44:22.661 UTC: As6 LCP: State is Listen Jun 28 15:44:23.521 UTC: As6 LCP: I
CONFREQ [Listen] id 2 len 46 ... Jun 28 15:44:23.525 UTC: Unthrottle 6 Jun 28 15:44:23.525 UTC:
As6 LCP: O CONFREQ [Listen] id 1 len 47 ... Jun 28 15:44:23.525 UTC: As6 LCP: O CONFREQ [Listen]
id 2 len 7 Jun 28 15:44:23.525 UTC: As6 LCP: Callback 6 (0x0D0306) Jun 28 15:44:25.525 UTC: As6
LCP: TIMEOUT: State REQsent Jun 28 15:44:25.525 UTC: As6 LCP: O CONFREQ [REQsent] id 2 len 47
... Jun 28 15:44:25.765 UTC: As6 LCP: I CONFACK [REQsent] id 2 len 47 ... Jun 28 15:44:26.533
UTC: As6 LCP: I CONFREQ [ACKrcvd] id 3 len 46 ... Jun 28 15:44:26.533 UTC: As6 LCP: O CONFREQ
[ACKrcvd] id 3 len 7 Jun 28 15:44:26.533 UTC: As6 LCP: Callback 6 (0x0D0306) Jun 28 15:44:26.741
UTC: As6 LCP: I CONFREQ [ACKrcvd] id 4 len 43 ... Jun 28 15:44:26.741 UTC: As6 LCP: O CONFACK
[ACKrcvd] id 4 len 43 ... Jun 28 15:44:26.741 UTC: As6 LCP: State is Open !--- LCP negotiation
is complete. !--- CHAP authentication begins. Jun 28 15:44:26.745 UTC: As6 PPP: Phase is
AUTHENTICATING, by this end Jun 28 15:44:26.745 UTC: As6 CHAP: O CHALLENGE id 1 len 36 from
"bobslake-nas-01" Jun 28 15:44:26.981 UTC: As6 CHAP: I RESPONSE id 1 len 27 from "charlie" Jun
28 15:44:26.981 UTC: As6 CHAP: O SUCCESS id 1 len 4
!--- CHAP authentication is successful. Jun 28 15:44:26.981 UTC: As6 MLP: Multilink up event
pending Jun 28 15:44:26.981 UTC: As6 PPP: Phase is VIRTUALIZED
!--- Link is virtualized. Jun 28 15:44:26.985 UTC: As6 MLP: charlie, multilink up
!--- Multilink connection is up. Jun 28 15:44:26.985 UTC: As6 IPCP: Remove route to 172.21.104.5
!--- Use IP address previously assigned to the bundle !--- (in this case, 172.21.104.2).
bobslake-nas-01#
```

故障排除

本部分提供的信息可用于对配置进行故障排除。

故障排除命令

输出解释器工具支持某些 **show** 命令（只限于注册用户），通过它可以查看 **show** 命令输出的分析

。

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

- **debug vtemplate** -显示从一个虚拟模板被克隆到时间下来的一个虚拟访问接口的克隆信息从时间。
- **debug ppp multilink events** - 显示关于影响多链路捆绑的事件的信息。
- **debug ppp negotiation** -显示协商链路控制协议(LCP)、认证和网络控制协议(NCP)时的 PPP数据流量和交换的信息。成功的PPP协商将首先开放LCP状态，然后进行验证，最后进行NCP协商。
- **debug ppp authentication** -显示PPP认证协议消息，包括质询握手验证协议(CHAP)信息包交换和密码认证协议交换。
- **debug ppp error** -显示与PPP连接协商和运行有关的协议错误和错误统计数据。
- **debug modem** - 显示接入服务器上的调制解调器线路活动情况。

相关信息

- [配置虚拟配置文件](#)
- [配置虚拟模板接口](#)
- [对基本拨号接入进行NAS配置](#)
- [显示呼叫方统计信息](#)
- [多链路 PPP RFC 1717](#)
- [拨号和接入技术支持](#)
- [技术支持和文档 - Cisco Systems](#)