

Multilink PPP assíncrono de roteador para roteador

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[Introdução](#)

Esta configuração descreve um Cisco 3640 remoto com um placa interna de modem analógico de 8 portas (NM-8AM) que disca para um Cisco AS5300 com uma interface de taxa primária (PRI). A configuração descreve uma conexão multilink composta de duas linhas telefônicas analógicas em um local remoto. Mais linhas telefônicas podem ser configuradas para MP, se estiverem disponíveis.

[Pré-requisitos](#)

[Requisitos](#)

Não existem requisitos específicos para este documento.

[Componentes Utilizados](#)

As informações neste documento são baseadas nas versões de software e hardware abaixo.

- Um Cisco 3640 que executa o Cisco IOS Software Release 12.1(3)
- Um Cisco AS5300 que executa o Cisco IOS Software Release 12.07(T)

Nota: O MP foi introduzido primeiramente no Cisco IOS Software Release 11.0(3).

As informações neste documento foram criadas a partir de dispositivos em um ambiente de laboratório específico. Todos os dispositivos utilizados neste documento foram iniciados com uma configuração (padrão) inicial. Se você estiver trabalhando em uma rede ativa, certifique-se de que entende o impacto potencial de qualquer comando antes de utilizá-lo.

Convenções

Para obter mais informações sobre convenções de documento, consulte as [Convenções de dicas técnicas Cisco](#).

Material de Suporte

O PPP multilink (MP) permite que dispositivos enviem dados em diversos enlaces de dados ponto-a-ponto para o mesmo destino implementando um enlace virtual. A conexão MP tem uma largura de banda máxima igual à soma das larguras de banda dos links componentes. O MP pode ser configurado para enlaces multifacetados, como ISDN e Frame Relay, ou para várias linhas assíncronas. Refira o [RFC 1990](#) para obter mais informações sobre do MP.

Nota: O RFC 1990 refere o Multilink PPP como o MP. Outros nomes pelos quais o <P é conhecido incluem MPPP, MLP e Multilink.

O MP assíncrono pode ser usado para conectar clientes remotos em uma velocidade maior do que está disponível através de uma única conexão analógica. No MP assíncrono, o cliente remoto usa modems múltiplos, e conseqüentemente linhas telefônica múltipla, para discar dentro ao roteador central e para alcançar a rede. Como várias linhas telefônicas são freqüentemente mais baratas que o serviço ISDN de Taxa de Interface Básica (BRI), o recurso MP Assíncrono oferece uma forma efetiva de aumentar as velocidades de conexão para usuários remotos ao mesmo tempo em que controlar os custos gerais. O MP assíncrono também é uma maneira eficaz de obter velocidades de acesso mais elevadas para áreas remotas que não podem ser servidas por ISDN.

O MP assíncrono reúne conexões separadas de modem em um Servidor de acesso. O software PPP em cada ponto fragmenta os pacotes e, em seguida, transmite as partes para o outro lado por meio de várias conexões analógicas. As extremidades de recebimento reúnem essas partes das conexões separadas e, com base nas informações de MP embutidas, remontam as partes em pacotes de dados válidos, fornecendo, assim, um enlace virtual de ponta a ponta com maior largura de banda. O MP assíncrono pode ser configurado entre dois roteadores ou entre um roteador e um PC cliente.

Configurar

Nesta seção, você encontrará informações para configurar os recursos descritos neste documento.

Nota: Para obter mais informações sobre os comandos usados neste documento use a [ferramenta de Consulta de comando](#).

[Diagrama de Rede](#)

Este documento utiliza a instalação de rede mostrada no diagrama abaixo.

[Configurações](#)

Este documento utiliza as configurações mostradas abaixo.

- [Cisco 3640](#)
- [Cisco AS5300](#)

Cisco 3640

```
clearlake-lan-01#show running-config Building
configuration... Current configuration: ! version 12.1
service timestamps debug datetime msec localtime show-
timezone service timestamps log datetime msec localtime
show-timezone ! hostname clearlake-lan-01 ! aaa new-
model aaa authentication login default local aaa
authentication ppp default if-needed local ! username
bobslake-nas-01 password <deleted> !--- Remote router
and password for CHAP authentication. !--- Dialer
interface must also be configured to use !--- this
username and password. username admin privilege 15
password <deleted> ! no ip domain-lookup ! chat-script
async-mppp ABORT ERROR ABORT BUSY "" "ATZ" OK "ATDT \T"
TIMEOUT 30 CONNECT \c !--- Chat script used for dialing
out. ! interface Loopback0 ip address 172.21.126.254
255.255.255.0 ! interface Ethernet0/0 ip address
172.21.125.1 255.255.255.0 ! interface Group-Async1 !---
Interface to configure modems used for dialout. no ip
address encapsulation ppp !--- Use PPP encapsulation for
members of this !--- group-async interface. dialer in-
band !--- Permit DDR on this interface. dialer pool-
member 10 !--- All members of this group-async interface
belong !--- to dialer pool 10. ppp multilink !--- Enable
PPP multilink on physical interface. group-range 33 34
!--- Assign async 33 and 34 to this group-async
interface. !--- This can be adjusted depending on the
number of POTS lines available. ! interface Dialer1 !---
Dialer interface to dialout to bobslake-nas-01. ip
address negotiated !--- Obtain an IP address from
central site. encapsulation ppp dialer remote-name
bobslake-nas-01 !--- Identify central site router for
CHAP authentication. !--- Shared secret password is
defined above. dialer pool 10 !--- Defines the pool of
physical resources that the Dialer !--- interface may
use. dialer idle-timeout 600 !--- Specifies number of
seconds without interesting traffic that !--- the
connection is kept up. dialer string 5551212 !--- Number
to be dialed; this number belongs to the PRI !--- of the
central router. dialer load-threshold 15 either !---
Load level for either inbound or outbound traffic !---
at which additional lines will be added to the MP
bundle. !--- Load level values range from 1 (unloaded)
to 255 (fully loaded). dialer-group 8 !--- Uses dialer-
list 8 to determine interesting traffic. ppp
authentication chap callin !--- Use CHAP authentication
for incoming calls only !--- This router will not
challenge remote routers for outgoing calls. ppp
multilink !--- Activates the interface for MP operation.
```

```

ppp timeout multilink link remove 300 !--- Keeps the
multilink connections up for 300 seconds !--- after the
load drops below the threshold. !--- This command should
be used to control flapping. ! ip classless ip route
0.0.0.0 0.0.0.0 Dialer1 !--- Use Interface Dialer1 for
all networks. no ip http server ! access-list 188 remark
define interesting traffic access-list 188 deny udp any
any eq ntp access-list 188 permit ip any any dialer-list
8 protocol ip list 188 !--- Assign access-list 188 to
dialer-list 8. ! line con 0 transport input none line 33
34 !--- Async lines to be used for dialout. !--- This
number should match the group-range in the !--- Group-
Async interface. script dialer async-mppp !--- Use chat
script called async-mppp for dialout. modem InOut modem
autoconfigure discovery transport preferred none
transport input all line 35 40 transport preferred none
transport input all line aux 0 line vty 0 4 ! ntp clock-
period 17179871 ntp server 172.22.255.1 prefer end

```

Cisco AS5300

```

bobslake-nas-01#show running-config Building
configuration... Current configuration: 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
clearlake-lan-01 password <deleted> !--- Remote router
and password for Challenge Handshake !--- Authentication
Protocol (CHAP) authentication. !--- The password must
be identical on both sides. spe 1/0 1/7 firmware
location system:/ucode/mica_port_firmware ! resource-
pool disable ! ip subnet-zero ! multilink virtual-
template 1 !--- Use virtual-template 1 for multilink
connections. 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 ! 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 Virtual-Template1 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
CHAP. ppp multilink !--- Allow multilink sessions. ! !--
- Configure D channel on PRI. interface Serial0:23
description Headquarters 555-1212 active PRI line no ip
address no ip directed-broadcast isdn switch-type
primary-5ess isdn incoming-voice mode 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 ip
unnumbered Loopback0 no ip directed-broadcast
encapsulation ppp dialer in-band dialer idle-timeout 600
either !--- Specifies number of seconds without
interesting !--- traffic that the connection is kept up.
!--- Configure the same idle-timeout on both routers.

```

```
dialer map ip 172.21.125.1 name clearlake-nas-01 dialer-
group 5 !--- Uses dialer-list 5 to determine interesting
traffic. async mode interactive peer default ip address
pool addr-pool !--- Use IP pool called addr-pool for
incoming calls. ppp authentication chap callin !---
Issue CHAP challenges for dialin users only. ppp
multilink group-range 1 48 !--- Assign modems 1-48 to
the Group-Async 1 configuration template. ! router eigrp
1 passive-interface Group-Async1 !--- To prevent routing
traffic on async lines. 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 !---
Define interesting traffic. dialer-list 5 protocol ip
list 105 !--- Assign access list 105 to dialer list 5. !
line con 0 transport input none line 1 48 autoselect
during-login !--- Permits user login prompts after
dialin. autoselect ppp !--- Automatically launches PPP
on the line. modem InOut !--- Modems can be used to
dialin and dialout. transport preferred none transport
output telnet line aux 0 line vty 0 4 ! ntp clock-period
17180374 ntp update-calendar ntp server 172.22.255.1
prefer end
```

Ajuste e comandos opcionais

Os comandos a seguir podem ser usados para ajustar o comportamento da conexão de MP. O ajuste cuidadoso de tais parâmetros pode ajudar a controlar custos evitando o desperdício e o uso desnecessário de enlaces de dados.

- **dialer load-threshold load[outbound | de entrada | ou]** O MP pode ser configurado de modo que os canais adicionais apareçam imediatamente após o canal principal ser estabelecido. Para setup esta encenação, ajuste o valor de limiar de carregamento no comando dialer load-threshold load a 1. neste caso, os canais adicionais são trazidos acima e continuam a ficar acima (isto é, não fazem flap). Se o limiar de carga estiver definido para qualquer valor, os canais múltiplos poderão sincronizar dependendo da carga no link. Se você quer ter os canais adicionais adicionados como necessário, segundo o tráfego, ajuste o limiar de carga ao valor apropriado entre 1 e 255. Por exemplo, para que os canais adicionais venham acima em por cento dos 50 pés, o ponto inicial deve ser ajustado a 128 (0.50×255). Ao determinar o limiar, deve-se considerar o tempo de configuração para chamadas assíncronas, porque tempos maiores de configuração podem necessitar de limiares mais baixos. A carga pode ser calculada com base em recebimentos, envios ou no maior tráfego recebido ou enviado na interface. Baseando ou não a carga na entrada, verifique se o local central tem interface passiva de grupo assíncrono 1 configurada para que as atualizações de roteamento do núcleo não sejam enviadas pela linha assíncrona. Impedir o tráfego de passar no enlace fornece mais largura de banda para outros dados na linha.
- **ppp timeout multilink link remove seconds** Esse comando pode ser usado para evitar que conexões multilink fiquem sem sincronização quando a carga variar. Por exemplo, quando o limiar de carga estiver definido como 15 (ou seja, $15/255=6\%$) e o tráfego exceder o limiar, linhas adicionais serão criadas. Quando o tráfego fica abaixo do limite, as linhas adicionais são descartadas. Em situações em que as taxas de dados são altamente variáveis, para canais múltiplos, é vantajoso ficar ativo por um período específico de tempo, mesmo quando o limite de carga fica abaixo do valor especificado. Atribua a este intervalo de multilink um tempo menor que o especificado para o intervalo de discador ocioso que controla o intervalo

de todos os links.

- **o link de timeout multilink PPP adiciona segundos** Este comando pode ser usado para impedir que os links múltiplos estejam adicionados ao pacote MP até que o tráfego elevado esteja recebido para um intervalo especificado. Isto pode impedir que as explosões do tráfego tragam desnecessariamente acima linhas adicionais.

Verificar

Esta seção fornece informações que você pode usar para confirmar se sua configuração está funcionando adequadamente.

Determinados comandos show são suportados pela Ferramenta Output Interpreter, que permite que você veja uma análise do resultado do comando show.

- **show ppp multilink** – Para exibir informações sobre conjuntos de multilink ativos. Este comando deve ser utilizado para verificar a conexão multilink.
- **show caller** – Para exibir as informações sobre usuários individuais e recursos consumidos no NAS. Este comando exibe estatísticas de chamadas ativas para grandes conjuntos de conexões e exibe os tempos absoluto e ocioso para cada usuário. Se sua versão do Cisco IOS Software não suporta este comando, utilize o comando show user.
- **show caller user** - Para mostrar parâmetros de um determinado usuário, como a linha de TTY usada, interface assíncrona (prateleira/slot/porta), número do canal DSO, número do modem, endereço IP atribuído, parâmetros de pacote PPP e PPP, etc. Se sua versão do Cisco IOS Software não suporta este comando, utilize o comando show user.

Exemplo de saída de show

Os seguintes show command outputs (resultado do comando show) são tomados do Cisco 3640 que está discando no AS5300. Mostra que a conexão multilink está acima

```
clearlake-lan-01#show ppp multilink Virtual-Access1, bundle name is bobslake-nas-01 !---  
Virtualized MP bundle. Bundle name is derived from the !--- username used during authentication.  
Dialer interface is Dialer1 !--- This Virtual Access Interface used Interface Dialer1. 0 lost  
fragments, 0 reordered, 0 unassigned 0 discarded, 0 lost received, 1/255 load 0x4 received  
sequence, 0x0 sent sequence Member links: 2 (max not set, min not set) Async34 Async33 !---  
Members of the MP bundle. clearlake-lan-01#show dialer As33 - dialer type = IN-BAND ASYNC NO-  
PARITY Dialer pool 10, priority 0 !--- Member of dialer pool 10. Idle timer (120 secs), Fast  
idle timer (20 secs) Wait for carrier (30 secs), Re-enable (15 secs) Dialer state is multilink  
member Dial reason: Multilink bundle overloaded !--- Interface was not the first link in the MP  
bundle. Interface bound to profile Dil Current call connected 00:00:54 !--- Current call  
duration Connected to <deleted>5551212 (bobslake-nas-01) !--- Phone number that was dialed. As34  
- dialer type = IN-BAND ASYNC NO-PARITY Dialer pool 10, priority 0 !--- Member of dialer pool  
10. Idle timer (600 secs), Fast idle timer (20 secs) Wait for carrier (30 secs), Re-enable (15  
secs) Dialer state is multilink member Dial reason: ip (s=172.21.125.1, d=172.21.104.254) !---  
Interface was the first link in the bundle, triggered by !--- interesting traffic. Interface  
bound to profile Dil Current call connected 00:00:54 !--- Current Call duration. Connected to  
5551212 <deleted> (bobslake-nas-01) !--- Phone number that was dialed. Gr1 - dialer type = IN-  
BAND ASYNC NO-PARITY Idle timer (120 secs), Fast idle timer (20 secs) Wait for carrier (30  
secs), Re-enable (15 secs) Dialer state is idle Dial String Successes Failures Last DNIS Last  
status Dil - dialer type = DIALER PROFILE Load threshold for dialing additional calls is 15 !---  
Load threshold. Idle timer (600 secs), Fast idle timer (20 secs) Wait for carrier (30 secs), Re-  
enable (15 secs) Dialer state is data link layer up Number of active calls = 2 Dial String  
Successes Failures Last DNIS Last status 15 0 00:00:56 successful Default clearlake-lan-01#show  
caller Active Idle Line User Service Time Time con 0 tarpon TTY 00:09:11 00:00:00 tty 33 - Async
```

```

- 00:00:01 TTY 34 - Async - 00:00:06 As33 bobslake-nas-01 PPP 00:00:24 00:00:00 !--- Second
connection. As34 bobslake-nas-01 PPP 00:01:05 00:00:00 !--- First connection. Vi1 bobslake-nas-
01 PPP Bundle 00:01:05 00:01:04 !--- MP bundle !--- bobslake-nas-01 has two async lines, two
TTY, and one virtual !--- interface bundle. clearlake-lan-01#show caller user bobslake-nas-01
User: bobslake-nas-01, line As33, service PPP !--- PPP setting for bobslake-nas-01. Active time
00:00:34, Idle time 00:00:00 Timeouts: Absolute Idle Limits: - - Disconnect in: - - PPP: LCP
Open, multilink Open, CHAP (-> AAA) !--- Multilink is up. Dialer: Connected 00:01:09 to
<deleted>, outbound !--- Dialer interface was used to dialout. Type is IN-BAND ASYNC, group
Dialer1 Cause: Multilink bundle overloaded !--- This interface was not the first member of the
MP bundle. IP: Local 172.21.104.48/32 Bundle: Member of bobslake-nas-01, last input 00:00:00
Counts: 59 packets input, 3529 bytes, 0 no buffer 0 input errors, 22 CRC, 0 frame, 0 overrun 31
packets output, 1515 bytes, 0 underruns 0 output errors, 0 collisions, 4 interface resets !---
Packets are passing through the connection. User: bobslake-nas-01, line As34, service PPP !---
PPP setting for user bobslake-nas-01. Active time 00:01:15, Idle time 00:00:00 Timeouts:
Absolute Idle Limits: - - Disconnect in: - - PPP: LCP Open, multilink Open, CHAP (-> AAA) !---
MP state is open. Dialer: Connected 00:01:10 to <deleted>, outbound Type is IN-BAND ASYNC, group
Dialer1 Cause: ip (s=172.21.125.1, d=172.21.104.254) !--- Dialing cause was interesting traffic;
this was the !--- first link in the bundle. IP: Local 172.21.104.48/32 Bundle: Member of
bobslake-nas-01, last input 00:00:00 Counts: 172 packets input, 20699 bytes, 0 no buffer 0 input
errors, 81 CRC, 0 frame, 0 overrun 80 packets output, 14347 bytes, 0 underruns 0 output errors,
0 collisions, 6 interface resets !--- Packets are passing through the connection. User:
bobslake-nas-01, line Vi1, service PPP Bundle !--- Bundle information for user bobslake-nas-01.
Active time 00:01:16, Idle time 00:01:15 Timeouts: Absolute Idle Limits: - 00:10:00 Disconnect
in: - 00:08:44 !--- Idle-timeout is 600 seconds(10 minutes). PPP: LCP Open, multilink Open, IPCP
Dialer: Connected 00:01:10 to <deleted>, outbound Idle timer 600 secs, idle 75 secs Type is IN-
BAND SYNC, group Dialer1 IP: Local 172.21.104.48/32, remote 172.21.104.254 !--- IP address
assigned to the bundle and loopback address !--- of the remote router. Bundle: First link of
bobslake-nas-01, 2 links, last input 00:01:16 Counts: 23 packets input, 4758 bytes, 0 no buffer
0 input errors, 0 CRC, 0 frame, 0 overrun 7 packets output, 3734 bytes, 0 underruns 0 output
errors, 0 collisions, 0 interface resets

```

Alguns show command outputs (resultado do comando show) do AS5300 são mostrados abaixo. Para mais saídas refira o [discagem PPP multilink assíncrona do documento da documentação de clientes de Microsoft Windows](#). A mostra e o resultado do debug do AS5300 (instalação central) serão similares para o MP assíncrono do PC-roteador e o MP assíncrono do Roteador-roteador.

```

bobslake-nas-01#show ppp multilink Virtual-Access1, bundle name is clearlake-lan-01 0 lost
fragments, 0 reordered, 0 unassigned, sequence 0x1/0x10 rcvd/sent 0 discarded, 0 lost received,
1/255 load Member links: 2 (max not set, min not set) Async47 Async45 bobslake-nas-01#show
caller Active Idle Line User Service Time Time TTY 45 clearlake-lan-01 Async 00:01:12 00:01:03
TTY 47 clearlake-lan-01 Async 00:01:51 00:00:06 vty 0 admin VTY 00:11:02 00:00:00 As45
clearlake-lan-01 PPP 00:01:02 00:00:00 As47 clearlake-lan-01 PPP 00:01:49 00:00:00 Vi1
clearlake-lan-01 PPP Bundle 00:01:43 00:01:10

```

[Troubleshooting](#)

Esta seção fornece informações que podem ser usadas para o troubleshooting da sua configuração.

[Procedimento de Troubleshooting](#)

Ao pesquisar defeitos uma conexão MP, continue da mesma forma os rendimentos do atendimento:

[Um exemplo de debug](#), identificado por meio de explicações no que procurar, é fornecido abaixo.

Ao testar sua configuração MP, assegure-se de que você esteja gerando bastante tráfego através do link para provocar o limiar de carga. Você pode ajustar o valor de limiar de carga durante seu teste como necessário.

1. Use os **comandos debug dialer and debug chat** verificar que o o discador está discando corretamente.
2. Verifique que a negociação de PPP e a autenticação são bem sucedidas. Pague a atenção à negociação de LCP onde os parâmetros MP alinham o Maximum Receive Reconstructed Unit (MRRU) e o discriminador de ponto final (EndpointDisc) é negociado.
3. Verifique que o link está virtualizado corretamente. Uma interface de acesso virtual será criada pelo Cisco IOS Software para representar o pacote MP.
4. Verifique que a negociação do protocolo de controle do protocolo de internet (IPCP) era bem sucedida. Note se os endereços IP de Um ou Mais Servidores Cisco ICM NT corretos estiveram atribuídos e se as rotas apropriadas estiveram instaladas.

Comandos para Troubleshooting

Determinados comandos show são suportados pela Ferramenta Output Interpreter, que permite que você veja uma análise do resultado do comando show.

Nota: Antes de emitir **comandos debug**, consulte [Informações importantes sobre comandos debug](#).

- **debug vtemplate** - Para indicar uma informação de clonagem para uma interface de acesso virtual do tempo onde seja clonada de um molde virtual ao tempo seja tomada para baixo.
- **debug ppp multilink events** – Para exibir informações sobre eventos que afetam os conjuntos multilink.
- **debug ppp negotiation** - Para exibir informações sobre tráfego e trocas de PPP ao negociar o Protocolo de Controle de Enlaces (LCP), autenticação e Protocolo de Controle de Rede (NCP). Uma negociação de PPP bem-sucedida abrirá primeiramente o estado do LCP e, em seguida, autenticará e, finalmente, negociará o NCP. Parâmetros multilink, como Maximum receive reconstructed unit (MRRU), são estabelecidos durante a negociação LCP.
- **debug ppp authentication** - Para exibir as mensagens do protocolo de autenticação PPP, incluindo trocas de pacote do Protocolo de autenticação de handshake de desafio (CHAP) e trocas do Protocolo de autenticação de senha (PAP).
- **debug ppp error** – Para exibir erros do protocolo e estatísticas de erros associados à negociação e operação da conexão PPP
- **debug modem** – Para exibir a atividade da linha de modem em um servidor de acesso.

Exemplo de debug

As seguintes saídas foram obtidas do Cisco 3640. Mostram o Cisco 3640 que discam o PRI do AS5300 e que estabelecem uma conexão MP. Para um exemplo do resultado do debug do AS5300 refira o [discagem PPP multilink assíncrona do](#) documento dos [clientes de Microsoft Windows](#).

```
clearlake-lan-01#debug dialer Dial on demand events debugging is on clearlake-lan-01#debug ppp negotiation PPP protocol negotiation debugging is on clearlake-lan-01#debug ppp authentication PPP authentication debugging is on clearlake-lan-01#debug vtemplate Virtual Template debugging is on clearlake-lan-01#debug ppp multilink events clearlake-lan-01#show debug Dial on demand: Dial on demand events debugging is on PPP: PPP authentication debugging is on PPP protocol negotiation debugging is on Multilink events debugging is on VTEMPLATE: Virtual Template debugging is on clearlake-lan-01#ping ip Target IP address: 172.21.104.254 Repeat count [5]: 20 Datagram size [100]: 1200 Timeout in seconds [2]: Extended commands [n]: Sweep range of sizes [n]: Type escape sequence to abort. Sending 20, 1200-byte ICMP Echos to 172.21.104.254, timeout
```


is 2 seconds: Jul 25 13:20:29.047 UTC: As34 DDR: rotor dialout [priority] Jul 25 13:20:29.047
UTC: As34 DDR: Dialing cause ip (s=172.21.125.1, d=172.21.104.254) *!--- Dialing Reason* Jul 25
13:20:29.047 UTC: As34 DDR: **Attempting to dial <deleted>5551212** *!--- Number being dialed* Jul 25
13:20:29.047 UTC: CHAT34: Attempting async line dialer script Jul 25 13:20:29.047 UTC: CHAT34:
Dialing using Modem script: async-mppp & System script: none *!--- Using chat script async-mppp
for dialout* Jul 25 13:20:29.051 UTC: CHAT34: process started Jul 25 13:20:29.051 UTC: CHAT34:
Asserting DTR Jul 25 13:20:29.051 UTC: CHAT34: Chat script async-mppp started *!--- Call is being
established; !--- note the time elapsed for call setup* Jul 25 13:20:54.831 UTC: CHAT34: Chat
script async-mppp finished, status = Success. Jul 25 13:20:56.831 UTC: **%LINK-3-UPDOWN: Interface
Async34, changed state to up** Jul 25 13:20:56.831 UTC: Async34 DDR: Dialer statechange to up Jul
25 13:20:56.831 UTC: **%DIALER-6-BIND: Interface As34 bound to profile Di1** Jul 25 13:20:56.831
UTC: Async34 DDR: Dialer call has been placed *!--- PPP negotiation begins* Jul 25 13:20:56.831
UTC: As34 PPP: Treating connection as a callout Jul 25 13:20:56.831 UTC: As34 PPP: Phase is
ESTABLISHING, Active Open Jul 25 13:20:56.831 UTC: As34 PPP: No remote authentication for call-
out *!--- CHAP challenge is configured for callin only !--- LCP negotiation begins; Multilink
parameters are also negotiated* Jul 25 13:20:56.835 UTC: As34 LCP: O CONFREQ [Closed] id 43 len
43 Jul 25 13:20:56.835 UTC: As34 LCP: ACCM 0x000A0000 (0x0206000A0000) Jul 25 13:20:56.835 UTC:
As34 LCP: MagicNumber 0x4395638E (0x05064395638E) Jul 25 13:20:56.835 UTC: As34 LCP: PFC
(0x0702) Jul 25 13:20:56.835 UTC: As34 LCP: ACFC (0x0802) Jul 25 13:20:56.835 UTC: As34 LCP:
MRRU 1524 (0x110405F4) *!--- Negotiate Maximum Receive Reconstructed Unit (MRRU) !--- MRRU is the
maximum packet size this end will reconstruct* Jul 25 13:20:56.835 UTC: As34 LCP: EndpointDisc 1
Local Jul 25 13:20:56.835 UTC: As34 LCP: (0x131301636C6561726C616B652D6C616E) Jul 25
13:20:56.835 UTC: As34 LCP: (0x2D3031). Jul 25 13:20:58.831 UTC: As34 LCP: TIMEOUT: State
REQsent Jul 25 13:20:58.831 UTC: As34 LCP: O CONFREQ [REQsent] id 44 Len 43 Jul 25 13:20:58.831
UTC: As34 LCP: ACCM 0x000A0000 (0x0206000A0000) Jul 25 13:20:58.831 UTC: As34 LCP: MagicNumber
0x4395638E (0x05064395638E) Jul 25 13:20:58.831 UTC: As34 LCP: PFC (0x0702) Jul 25 13:20:58.831
UTC: As34 LCP: ACFC (0x0802) Jul 25 13:20:58.831 UTC: As34 LCP: MRRU 1524 (0x110405F4) Jul 25
13:20:58.831 UTC: As34 LCP: EndpointDisc 1 Local Jul 25 13:20:58.831 UTC: As34 LCP:
(0x131301636C6561726C616B652D6C616E) Jul 25 13:20:58.831 UTC: As34 LCP: (0x2D3031). Jul 25
13:21:00.831 UTC: As34 LCP: TIMEOUT: State REQsent Jul 25 13:21:00.831 UTC: As34 LCP: O CONFREQ
[REQsent] id 45 Len 43 Jul 25 13:21:00.831 UTC: As34 LCP: ACCM 0x000A0000 (0x0206000A0000) Jul
25 13:21:00.831 UTC: As34 LCP: MagicNumber 0x4395638E (0x05064395638E) Jul 25 13:21:00.831 UTC:
As34 LCP: PFC (0x0702) Jul 25 13:21:00.831 UTC: As34 LCP: ACFC (0x0802) Jul 25 13:21:00.831 UTC:
As34 LCP: MRRU 1524 (0x110405F4) Jul 25 13:21:00.831 UTC: As34 LCP: EndpointDisc 1 Local Jul 25
13:21:00.831 UTC: As34 LCP: (0x131301636C6561726C616B652D6C616E) Jul 25 13:21:00.831 UTC: As34
LCP: (0x2D3031) Jul 25 13:21:01.135 UTC: **As34 LCP: I CONFACK [REQsent] id 45 Len 43** Jul 25
13:21:01.135 UTC: As34 LCP: ACCM 0x000A0000 (0x0206000A0000) Jul 25 13:21:01.135 UTC: As34 LCP:
MagicNumber 0x4395638E (0x05064395638E) Jul 25 13:21:01.135 UTC: As34 LCP: PFC (0x0702) Jul 25
13:21:01.135 UTC: As34 LCP: ACFC (0x0802) Jul 25 13:21:01.135 UTC: **As34 LCP: MRRU 1524
(0x110405F4)** Jul 25 13:21:01.135 UTC: As34 LCP: EndpointDisc 1 Local Jul 25 13:21:01.135 UTC:
As34 LCP: (0x131301636C6561726C616B652D6C616E) Jul 25 13:21:01.135 UTC: As34 LCP: (0x2D3031) Jul
25 13:21:01.139 UTC: As34 LCP: I CONFREQ [ACKrcvd] id 6 Len 47 Jul 25 13:21:01.139 UTC: As34
LCP: ACCM 0x000A0000 (0x0206000A0000) Jul 25 13:21:01.143 UTC: As34 LCP: AuthProto CHAP
(0x0305C22305) Jul 25 13:21:01.143 UTC: As34 LCP: MagicNumber 0xE16DFC8D (0x0506E16DFC8D) Jul 25
13:21:01.143 UTC: As34 LCP: PFC (0x0702) Jul 25 13:21:01.143 UTC: As34 LCP: ACFC (0x0802) Jul 25
13:21:01.143 UTC: As34 LCP: MRRU 1524 (0x110405F4) Jul 25 13:21:01.143 UTC: As34 LCP:
EndpointDisc 1 Local Jul 25 13:21:01.143 UTC: As34 LCP: (0x131201626F62736C616B652D6E61732D) Jul
25 13:21:01.143 UTC: As34 LCP: (0x3031) Jul 25 13:21:01.143 UTC: **As34 LCP: O CONFACK [ACKrcvd]
id 6 Len 47** Jul 25 13:21:01.143 UTC: As34 LCP: ACCM 0x000A0000 (0x0206000A0000) Jul 25
13:21:01.143 UTC: As34 LCP: AuthProto CHAP (0x0305C22305) Jul 25 13:21:01.143 UTC: As34 LCP:
MagicNumber 0xE16DFC8D (0x0506E16DFC8D) Jul 25 13:21:01.143 UTC: As34 LCP: PFC (0x0702) Jul 25
13:21:01.143 UTC: As34 LCP: ACFC (0x0802) Jul 25 13:21:01.143 UTC: **As34 LCP: MRRU 1524
(0x110405F4)** Jul 25 13:21:01.143 UTC: As34 LCP: EndpointDisc 1 Local Jul 25 13:21:01.143 UTC:
As34 LCP: (0x131201626F62736C616B652D6E61732D) Jul 25 13:21:01.143 UTC: As34 LCP: (0x3031) *!---
Both sides have CONFACKed the parameters !--- MRRU of 1524 bytes and the Endpoint Discriminator
have been negotiated* Jul 25 13:21:01.143 UTC: As34 LCP: State is Open *!--- LCP negotiation
complete* Jul 25 13:21:01.147 UTC: As34 PPP: Phase is AUTHENTICATING, by the peer *!--- Received a
challenge from the remote router* Jul 25 13:21:01.351 UTC: As34 CHAP: I CHALLENGE id 3 Len 36
from "bobslake-nas-01" Jul 25 13:21:01.351 UTC: As34 CHAP: O RESPONSE id 3 Len Jul 25
13:21:01.539 UTC: As34 CHAP: I SUCCESS id 3 Len 4 *!--- CHAP authentication successful* Jul 25
13:21:01.539 UTC: As34 PPP: Phase is VIRTUALIZED *!--- Virtualize Async 34 !--- Virtual Access
interface will represent the MP bundle* Jul 25 13:21:01.543 UTC: V11 VTEMPLATE: Reuse V11,
recycle queue size 0 Jul 25 13:21:01.543 UTC: V11 VTEMPLATE: Hardware address 0030.9401.f101 Jul
25 13:21:01.543 UTC: V11 PPP: Phase is DOWN, Setup Jul 25 13:21:01.543 UTC: %DIALER-6-BIND:

Interface Vi1 bound to profile Di1 Jul 25 13:21:01.543 UTC: Vi1 VTEMPLATE: Has a new cloneblk dialer, now it has dialer Jul 25 13:21:01.547 UTC: %LINK-3-UPDOWN: Interface Virtual-Access1, changed state to up Jul 25 13:21:01.547 UTC: Virtual-Access1 DDR: Dialer statechange to up *!--- Virtual Access Interface is up !-- Negotiate LCP and PPP parameters for Virtual-Access Interface* Jul 25 13:21:01.547 UTC: Virtual-Access1 DDR: Dialer call has been placed Jul 25 13:21:01.547 UTC: Vi1 PPP: Treating connection as a callout Jul 25 13:21:01.547 UTC: Vi1 PPP: Phase is ESTABLISHING, Active Open Jul 25 13:21:01.547 UTC: Vi1 PPP: No remote authentication for call-out Jul 25 13:21:01.547 UTC: Vi1 LCP: O CONFREQ [Closed] id 1 Len 33 Jul 25 13:21:01.547 UTC: Vi1 LCP: MagicNumber 0x439575FC (0x0506439575FC) Jul 25 13:21:01.547 UTC: Vi1 LCP: MRRU 1524 (0x110405F4) Jul 25 13:21:01.551 UTC: Vi1 LCP: EndpointDisc 1 Local Jul 25 13:21:01.551 UTC: Vi1 LCP: (0x131301636C6561726C616B652D6C616E) Jul 25 13:21:01.551 UTC: Vi1 LCP: (0x2D3031) Jul 25 13:21:01.551 UTC: Vi1 PPP: Phase is UP Jul 25 13:21:01.551 UTC: Vi1 IPCP: O CONFREQ [Closed] id 1 Len 10 Jul 25 13:21:01.551 UTC: Vi1 IPCP: Address 0.0.0.0 (0x030600000000) Jul 25 13:21:01.551 UTC: **As34 MLP: bobslake-nas-01, multilink up, first link !-- First multilink connection is virtualized** Jul 25 13:21:01.651 UTC: Vi1 IPCP: I CONFREQ [REQsent] id 1 Len 10 Jul 25 13:21:01.651 UTC: Vi1 IPCP: Address 172.21.104.254 (0x0306AC1568FE) Jul 25 13:21:01.651 UTC: Vi1 IPCP: O CONFACK [REQsent] id 1 Len 10 Jul 25 13:21:01.651 UTC: Vi1 IPCP: Address 172.21.104.254 (0x0306AC1568FE) Jul 25 13:21:01.731 UTC: Vi1 IPCP: I CONFNAK [ACKsent] id 1 Len 10 Jul 25 13:21:01.731 UTC: Vi1 IPCP: Address 172.21.104.48 (0x0306AC156830) Jul 25 13:21:01.731 UTC: Vi1 IPCP: O CONFREQ [ACKsent] id 2 Len 10 Jul 25 13:21:01.731 UTC: Vi1 IPCP: Address 172.21.104.48 (0x0306AC156830) Jul 25 13:21:01.915 UTC: Vi1 IPCP: I CONFACK [ACKsent] id 2 Len 10 Jul 25 13:21:01.915 UTC: Vi1 IPCP: Address 172.21.104.48 (0x0306AC156830) Jul 25 13:21:01.915 UTC: Vi1 IPCP: State is Open Jul 25 13:21:01.915 UTC: Di1 IPCP: Install negotiated IP interface address 172.21.104.48 *!--- IP address is assigned to virtual-access interface* Jul 25 13:21:01.919 UTC: Vi1 DDR: dialer protocol up Jul 25 13:21:01.919 UTC: Di1 IPCP: Install route to 172.21.104.254 *!--- Route to loopback address of remote router* Jul 25 13:21:02.539 UTC: %LINEPROTO-5-UPDOWN: Line protocol on Interface Async34, changed state to up Jul 25 13:21:02.551 UTC: %LINEPROTO-5-UPDOWN: Line protocol on Interface Virtual-Access1, changed state to up *!--- Full connectivity with first async connection !-- Begin dialout using second async interface* Jul 25 13:21:08.191 UTC: As33 DDR: rotor dialout [priority] Jul 25 13:21:08.191 UTC: **As33 DDR: Attempting to dial <deleted>5551212 !-- Number to be dialed; this number is the PRI on the remote router** Jul 25 13:21:08.191 UTC: CHAT33: Attempting async line dialer script Jul 25 13:21:08.191 UTC: CHAT33: Dialing using Modem script: async-mppp & System script: none *!--- Use chat script async-mppp for dialout* Jul 25 13:21:08.191 UTC: CHAT33: process started Jul 25 13:21:08.191 UTC: CHAT33: Asserting DTR Jul 25 13:21:08.191 UTC: CHAT33: Chat script async-mppp started Jul 25 13:21:33.859 UTC: CHAT33: Chat script async-mppp finished, status = Success *!--- Chat script successful* Jul 25 13:21:35.859 UTC: %LINK-3-UPDOWN: Interface Async33, changed state to up Jul 25 13:21:35.859 UTC: Async33 DDR: Dialer statechange to up Jul 25 13:21:35.859 UTC: %DIALER-6-BIND: Interface As33 bound to profile Di1 Jul 25 13:21:35.859 UTC: Async33 DDR: Dialer call has been placed *!--- PPP negotiation begins* Jul 25 13:21:35.859 UTC: As33 PPP: Treating connection as a callout Jul 25 13:21:35.859 UTC: As33 PPP: Phase is ESTABLISHING, Active Open Jul 25 13:21:35.859 UTC: As33 PPP: No remote authentication for call-out *!--- CHAP challenge is configured for callin only !-- LCP negotiation begins; Multilink parameters are also negotiated* Jul 25 13:21:35.863 UTC: As33 LCP: O CONFREQ [Closed] id 21 Len 43 Jul 25 13:21:35.863 UTC: As33 LCP: ACCM 0x000A0000 (0x0206000A0000) Jul 25 13:21:35.863 UTC: As33 LCP: MagicNumber 0x4395FC05(0x05064395FC05) Jul 25 13:21:35.863 UTC: As33 LCP: PFC (0x0702) Jul 25 13:21:35.863 UTC: As33 LCP: ACFC (0x0802) Jul 25 13:21:35.863 UTC: As33 LCP: MRRU 1524 (0x110405F4) *!--- negotiate Maximum Receive Reconstructed Unit (MRRU)* Jul 25 13:21:35.863 UTC: As33 LCP: EndpointDisc 1 Local Jul 25 13:21:35.863 UTC: As33 LCP: (0x131301636C6561726C616B652D6C616E) Jul 25 13:21:35.863 UTC: As33 LCP: (0x2D3031) Jul 25 13:21:37.859 UTC: As33 LCP: TIMEOUT: State REQsent Jul 25 13:21:37.859 UTC: As33 LCP: O CONFREQ [REQsent] id 22 Len 43 Jul 25 13:21:37.859 UTC: As33 LCP: ACCM 0x000A0000 (0x0206000A0000) Jul 25 13:21:37.859 UTC: As33 LCP: MagicNumber 0x4395FC05 (0x05064395FC05) Jul 25 13:21:37.859 UTC: As33 LCP: PFC (0x0702) Jul 25 13:21:37.859 UTC: As33 LCP: ACFC (0x0802) Jul 25 13:21:37.859 UTC: As33 LCP: MRRU 1524 (0x110405F4) Jul 25 13:21:37.859 UTC: As33 LCP: EndpointDisc 1 Local Jul 25 13:21:37.859 UTC: As33 LCP: (0x131301636C6561726C616B652D6C616E) Jul 25 13:21:37.859 UTC: As33 LCP: (0x2D3031) Jul 25 13:21:39.859 UTC: As33 LCP: TIMEOUT: State REQsent Jul 25 13:21:39.859 UTC: As33 LCP: O CONFREQ [REQsent] id 23 Len 43 Jul 25 13:21:39.859 UTC: As33 LCP: ACCM 0x000A0000 (0x0206000A0000) Jul 25 13:21:39.859 UTC: As33 LCP: MagicNumber 0x4395FC05 (0x05064395FC05) Jul 25 13:21:39.859 UTC: As33 LCP: PFC (0x0702) Jul 25 13:21:39.859 UTC: As33 LCP: ACFC (0x0802) Jul 25 13:21:39.859 UTC: As33 LCP: MRRU 1524 (0x110405F4) Jul 25 13:21:39.859 UTC: As33 LCP: EndpointDisc 1 Local Jul 25 13:21:39.859 UTC: As33 LCP: (0x131301636C6561726C616B652D6C616E) Jul 25 13:21:39.859 UTC: As33 LCP: (0x2D3031) Jul 25 13:21:40.199 UTC: As33 LCP: I CONFREQ [REQsent] id 6 Len 47 Jul 25 13:21:40.199 UTC: As33 LCP:

ACCM 0x000A0000 (0x0206000A0000) Jul 25 13:21:40.203 UTC: As33 LCP: AuthProto CHAP (0x0305C22305) Jul 25 13:21:40.203 UTC: As33 LCP: MagicNumber 0xE16E950F (0x0506E16E950F) Jul 25 13:21:40.203 UTC: As33 LCP: PFC (0x0702) Jul 25 13:21:40.203 UTC: As33 LCP: ACFC (0x0802) Jul 25 13:21:40.203 UTC: As33 LCP: MRRU 1524 (0x110405F4) Jul 25 13:21:40.203 UTC: As33 LCP: EndpointDisc 1 Local Jul 25 13:21:40.203 UTC: As33 LCP: (0x131201626F62736C616B652D6E61732D) Jul 25 13:21:40.203 UTC: As33 LCP: (0x3031) Jul 25 13:21:40.203 UTC: **As33 LCP: O CONFACK [REQsent] id 6 Len 47 !---** *PPP parameters are agreed on (CONFACKed) by both sides* Jul 25 13:21:40.203 UTC: As33 LCP: ACCM 0x000A0000 (0x0206000A0000) Jul 25 13:21:40.203 UTC: As33 LCP: AuthProto CHAP (0x0305C22305) Jul 25 13:21:40.203 UTC: As33 LCP: MagicNumber 0xE16E950F (0x0506E16E950F) Jul 25 13:21:40.203 UTC: As33 LCP: PFC (0x0702) Jul 25 13:21:40.203 UTC: As33 LCP: ACFC (0x0802) Jul 25 13:21:40.203 UTC: **As33 LCP: MRRU 1524 (0x110405F4) !---** *MRRU of 1524 bytes is accepted* Jul 25 13:21:40.203 UTC: As33 LCP: EndpointDisc 1 Local Jul 25 13:21:40.203 UTC: As33 LCP: (0x131201626F62736C616B652D6E61732D) Jul 25 13:21:40.203 UTC: As33 LCP: (0x3031) Jul 25 13:21:40.207 UTC: **As33 LCP: I CONFACK [ACKsent] id 23 Len 43 !---** *PPP parameters are agreed on (CONFACKed) by both sides* Jul 25 13:21:40.207 UTC: As33 LCP: ACCM 0x000A0000 (0x0206000A0000) Jul 25 13:21:40.207 UTC: As33 LCP: MagicNumber 0x4395FC05 (0x05064395FC05) Jul 25 13:21:40.207 UTC: As33 LCP: PFC (0x0702) Jul 25 13:21:40.207 UTC: As33 LCP: ACFC (0x0802) Jul 25 13:21:40.207 UTC: **As33 LCP: MRRU 1524 (0x110405F4) !---** *MRRU of 1524 bytes is accepted* Jul 25 13:21:40.207 UTC: As33 LCP: EndpointDisc 1 Local Jul 25 13:21:40.207 UTC: As33 LCP: (0x131301636C6561726C616B652D6C616E) Jul 25 13:21:40.207 UTC: As33 LCP: (0x2D3031) **!---** *LCP negotiation is complete* Jul 25 13:21:40.207 UTC: As33 LCP: State is Open Jul 25 13:21:40.207 UTC: As33 PPP: Phase is AUTHENTICATING, by the peer **!---** *CHAP authentication begins* Jul 25 13:21:40.419 UTC: As33 CHAP: I CHALLENGE id 3 Len 36 from "bobslake-nas-01" **!---** *Received challenge from bobslake-nas-01* Jul 25 13:21:40.423 UTC: As33 CHAP: O RESPONSE id 3 Len 37 from "clearlake-lan-01" Jul 25 13:21:42.528 UTC: As33 CHAP: I SUCCESS id 3 Len 4 **!---** *CHAP authentication is successful* Jul 25 13:21:42.528 UTC: As33 PPP: Phase is VIRTUALIZED **!---** *Async 33 is added to Virtualized MP bundle* Jul 25 13:21:42.528 UTC: **As33 MLP: bobslake-nas-01, multilink up !---** *Multilink connection is up* Jul 25 13:21:43.528 UTC: %LINEPROTO-5-UPDOWN: Line protocol on Interface Async33, changed state to up clearlake-lan-01# Jul 25 13:23:52.028 UTC: Vi1 MLP: Disabling particle-fastswitching in 'bobslake-nas-01' Jul 25 13:23:52.028 UTC: Vi1 MLP: Enabling particle-fastswitching on 'bobslake-nas-01' **!---** *Cisco IOS adjusting fast switching strategy to keep in step !---* *with delivery of packet fragments* Jul 25 13:23:53.872 UTC: Vi1 MLP: Disabling particle-fastswitching in 'bobslake-nas-01' Jul 25 13:23:53.884 UTC: Vi1 MLP: Enabling particle-fastswitching on 'bobslake-nas-01'

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