

配置电缆上的 GRE 通道

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简介

本文包含电缆环境中的通用路由封装 (GRE) 的说明、配置和验证。GRE是Cisco开发的一种隧道协议，能够将广泛的协议信息包类型封装在IP隧道内。

开始使用前

规则

有关文档规则的详细信息，请参阅 [Cisco 技术提示规则](#)。

先决条件

本文档没有任何特定的前提条件。

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 12.1(5)T4 的电缆调制解调器 uBR924

注意：虽然使用不同的思科IOS版本，可以在其他Cisco 有线调制解调器平台（如uBR904平台）上配置GRE通道，但是该功能正式支持的版本是Cisco IOS 12.1(5)T4 for uBR920 和Cisco IOS 12.1(3) for uBR910。

电缆调制解调器平台	Cisco IOS 软件版本
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uBR920	12.1(5)T4
uBR910	从 12.1(3) 及更高版本

要运行此配置，两个电缆调制解调器之间需要有 [IP 连接](#)。

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。

背景理论

隧道建立提供将外国协议的信息封装在传输协议内部的一种方式。通道实施作为一个虚拟接口，为配置提供简单接口。隧道接口不依赖于特定的乘客或传输协议，但是它是提供实施任何标准的点到点封装机制所需业务的体系结构。隧道是点对点链路，并且您必须为每条链路配置一个单独隧道。

GRE 创建经由 IP 互连网络连接远程点上 Cisco 路由器的虚拟点对点链接。通过在单协议骨干网环境连接多协议子网络，使用GRE的IP隧道允许网络扩展穿越整个单协议骨干网环境。有线调制解调器终端系统（CMTS）是兼容任意电缆传输数据服务接口规格(DOCSIS）的头端有线路由器，如 Cisco UBR7246、uBR7223或uBR7246VXR。

配置

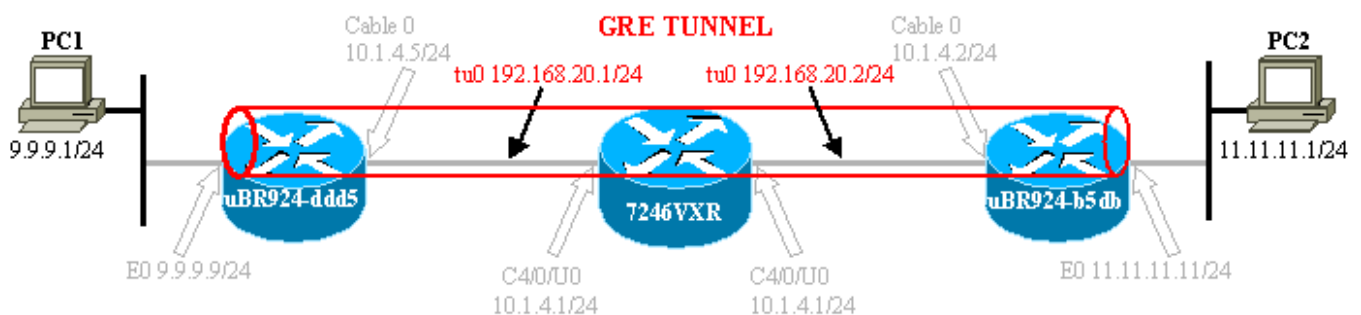
本部分提供有关如何配置本文档所述功能的信息。

网络图

本文档使用下图所示的网络设置。

此设置在两个电缆调制解调器 uBR924-ddd5 和 uBR924-b5db 之间创建一个隧道。以下示例使用两个 uBR924 和一个 uBR7246VXR。在此设置中，有线调制解调器的名称是ubr924-ddd5和ubr924-b5db，它们使用的是Cisco IOS版本12.1(5)T4。此隧道接口通过发出 interface tunnel 0 命令在全局配置模式中动态创建。

注意： 只要二个有线调制解调器之间有IP连接，那么uBR900 有线调制解调器就无需连接到同一个uBR7200 CMTS或同一个服务提供商网络上。



配置

本文档使用如下所示的配置。

注意：粗体文本指 GRE 相关命令。注释为蓝色，指上一行。

ubr924-ddd5

```
version 12.1
no service single-slot-reload-enable
no service pad
service timestamps debug uptime
service timestamps log uptime
no service password-encryption
!
hostname ubr924-ddd5 ! logging rate-limit console 10
except errors ! clock timezone - -80 ip subnet-zero no
ip finger ! call rsvp-sync ! ! ! ! ! ! ! ! ! ! interface
Tunnel0 !--- Tunnel interface 0. ip address 192.168.20.1
255.255.255.0 !--- IP address of the GRE tunnel
interface 0. tunnel source Ethernet0 !--- IP source of
the tunnel. It is best to make this an !--- interface
with a public, routable IP address so that !--- it is
reachable from the other endpoint of the tunnel. tunnel
destination 11.11.11.11 !--- IP destination of the
tunnel. Make sure this is !--- reachable via the ping
command !--- Otherwise, the tunnel will not be created
properly. ! interface Ethernet0 ip address 9.9.9.9
255.255.255.0 ip rip send version 2 !--- Send RIP
version 2 packets. ip rip receive version 2 !--- Receive
RIP version 2 packets. ! interface cable-modem0 ip rip
send version 2 !--- Send RIP version 2 packets. ip rip
receive version 2 !--- Receive RIP version 2 packets.
cable-modem downstream saved channel 525000000 40 1
cable-modem mac-timer t2 40000 no cable-modem compliant
bridge ! router rip version 2 passive-interface Tunnel0
!--- This command is used to avoid recursive routing.
network 10.0.0.0 network 9.0.0.0 no auto-summary ! ip
default-gateway 10.1.4.1 ip classless no ip http server
no ip http cable-monitor ! snmp-server packetsize 4096
snmp-server manager ! voice-port 0 input gain -2 !
voice-port 1 input gain -2 ! ! line con 0 transport
input none line vty 0 4 login ! end ubr924-ddd5#
```

ubr924-b5db

```
version 12.1
no service single-slot-reload-enable
no service pad
service timestamps debug uptime
service timestamps log uptime
no service password-encryption
!
hostname ubr924-b5db ! logging rate-limit console 10
except errors enable password ww ! clock timezone - -80
ip subnet-zero no ip finger ! mgcp call rsvp-sync ! ! !
! ! ! ! ! ! ! interface Tunnel0 !--- Tunnel interface 0
ip address 192.168.20.2 255.255.255.0 !--- IP address of
the gre tunnel interface 0 tunnel source Ethernet0 !---
IP source of the tunnel. It is best to make this an !---
interface with a public, routable IP address so that !---
- it is reachable from the other endpoint of the tunnel.
tunnel destination 9.9.9.9 !--- IP destination of the
tunnel. Make sure this is !--- reachable via the ping
command !--- Otherwise, the tunnel will not be created
properly. ! interface Ethernet0 ip address 11.11.11.11
255.255.255.0 ip rip send version 2 !--- Send RIP
version 2 packets. ip rip receive version 2 !--- Receive
```

```

RIP version 2 packets. ! no ip route-cache no ip mroute-
cache ! interface cable-modem0 ip rip send version 2 !--
- Send RIP version 2 packets. ip rip receive version 2
!--- Receive RIP version 2 packets. no ip route-cache no
ip mroute-cache no cable-modem compliant bridge ! router
rip version 2 passive-interface Tunnel0 !--- This
command is used to avoid recursive routing. network
10.0.0.0 network 11.0.0.0 no auto-summary ! ip default-
gateway 10.1.4.1 ip classless no ip http server no ip
http cable-monitor ! snmp-server packetsize 4096 snmp-
server manager ! voice-port 0 input gain -2 ! voice-port
1 input gain -2 ! ! line con 0 exec-timeout 0 0
transport input none line vty 0 4 password ww login !
end ubr924-b5db#

```

验证

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

。

验证CMTS (7246VXR)配置正确，并且调制解调器处于联机状态。CMTS 的配置如下所示。

```

7246VXR#show run Building configuration... Current configuration : 4579 bytes !! Last
configuration change at 13:22:17 PDT Mon Feb 26 2001 ! NVRAM config last updated at 13:22:46 PDT
Mon Feb 26 2001 ! version 12.1 no service single-slot-reload-enable no service pad service
timestamps debug datetime msec localtime service timestamps log datetime localtime no service
password-encryption service linenumber service udp-small-servers max-servers no-limit ! hostname
7246VXR ! logging buffered 1000000 debugging logging rate-limit console 10 except errors enable
password cable ! cable qos profile 8 cable qos profile 10 cable qos profile 10 grant-size 1500
cable qos profile 12 guaranteed-upstream 100000 no cable qos permission create no cable qos
permission update cable qos permission modems cable time-server clock timezone PDT -8 clock
summer-time PDT recurring clock calendar-valid ip subnet-zero no ip finger ! interface
Ethernet2/0 ip address 172.16.30.4 255.255.255.192 no ip mroute-cache half-duplex ! interface
Cable4/0 ip address 172.16.29.1 255.255.255.224 secondary ip address 10.1.4.1 255.255.255.0 no
keepalive cable downstream rate-limit token-bucket shaping cable downstream annex B cable
downstream modulation 64qam cable downstream interleave-depth 32 cable downstream frequency
555000000 cable upstream 0 frequency 40000000 cable upstream 0 power-level 0 no cable upstream 0
shutdown cable upstream 1 shutdown cable upstream 2 shutdown cable upstream 3 shutdown cable
upstream 4 shutdown cable upstream 5 shutdown cable dhcp-giaddr policy cable helper-address
172.16.30.2 ! interface Cable5/0 ip address 172.16.29.225 255.255.255.224 secondary ip address
10.1.5.1 255.255.255.0 load-interval 30 no keepalive cable downstream rate-limit token-bucket
shaping cable downstream annex B cable downstream modulation 64qam cable downstream interleave-
depth 32 cable downstream frequency 620000000 cable upstream 0 frequency 25008000 cable upstream
0 power-level 0 no cable upstream 0 shutdown no cable upstream 1 shutdown cable dhcp-giaddr
policy ! router eigrp 202 redistribute connected redistribute static network 10.0.0.0 network
172.16.0.0 no auto-summary no eigrp log-neighbor-changes ! router rip version 2 redistribute
connected redistribute static network 10.0.0.0 network 172.16.0.0 no auto-summary ! ip default-
gateway 172.16.30.1 ip classless ip route 0.0.0.0 0.0.0.0 172.16.30.1 ip route 172.16.30.0
255.255.255.0 Ethernet2/0 ip http server ip http authentication local ! access-list 188 permit
tcp any any eq www log access-list 188 permit ip any any route-map docsis permit 10 ! snmp-
server engineID local 00000009020000E01ED77E40 snmp-server community public RO snmp-server
community private RW line con 0 exec-timeout 0 0 transport input none line aux 0 speed 19200
line vty 0 4 session-timeout 60 exec-timeout 0 0 ! ntp clock-period 17179973 end 7246VXR#show
cable modem Interface Prim Online Timing Rec QoS CPE IP address MAC address Sid State Offset
Power Cable4/0/U0 69 online 2812 0.25 5 0 10.1.4.3 0002.1685.b5db Cable4/0/U0 70 online 2288
0.00 5 0 10.1.4.6 0010.7bed.9b23 Cable4/0/U0 71 online 2289 0.50 5 0 10.1.4.2 0010.7bed.9b45
Cable4/0/U0 72 online 2812 0.00 5 0 10.1.4.4 0002.fdfa.0a63 Cable4/0/U0 73 online 2812 -0.75 5 0

```

10.1.4.5 0004.2752.ddd5 Cable4/0/U0 74 online 2813 0.25 5 0 10.1.4.7 0001.64ff.e47d

如果电缆调制解调器在线状态不显示 online，请参阅[针对 uBR 电缆调制解调器不在线进行故障排除文档](#)。

```
7246VXR#show ip interface brief Interface IP-Address OK? Method Status Protocol FastEthernet0/0
192.168.7.253 YES NVRAM up down Ethernet2/0 172.16.30.4 YES manual up up Ethernet2/1 unassigned
YES NVRAM administratively down down Ethernet2/2 unassigned YES NVRAM administratively down down
Ethernet2/3 unassigned YES NVRAM administratively down down Cable3/0 10.1.3.1 YES manual up up
Cable4/0 10.1.4.1 YES manual up up Cable5/0 10.1.5.1 YES manual up up 7246VXR#show ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP D - EIGRP, EX - EIGRP
external, O - OSPF, IA - OSPF inter area N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external
type 2 E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP i - IS-IS, L1 - IS-IS
level-1, L2 - IS-IS level-2, ia - IS-IS inter area * - candidate default, U - per-user static
route, o - ODR P - periodic downloaded static route Gateway of last resort is 172.16.30.1 to
network 0.0.0.0 172.16.0.0/16 is variably subnetted, 4 subnets, 3 masks C 172.16.29.224/27 is
directly connected, Cable5/0 C 172.16.29.0/27 is directly connected, Cable4/0 S 172.16.30.0/24
is directly connected, Ethernet2/0 C 172.16.30.0/26 is directly connected, Ethernet2/0
9.0.0.0/24 is subnetted, 1 subnets R 9.9.9.0 [120/1] via 10.1.4.5, 00:00:09, Cable4/0 R
192.168.20.0/24 [120/1] via 10.1.4.5, 00:00:09, Cable4/0 10.0.0.0/8 is variably subnetted, 5
subnets, 2 masks C 10.1.3.0/24 is directly connected, Cable3/0 R 10.5.5.0/24 [120/1] via
10.1.4.4, 00:00:01, Cable4/0 R 10.0.0.0/8 [120/1] via 172.16.30.10, 00:00:24, Ethernet2/0 C
10.1.5.0/24 is directly connected, Cable5/0 C 10.1.4.0/24 is directly connected, Cable4/0
11.0.0.0/24 is subnetted, 1 subnets R 11.11.11.0 [120/1] via 10.1.4.3, 00:00:15, Cable4/0 S*
0.0.0.0/0 is directly connected
```

从电缆调制解调器侧，验证两个设备的 sh version，如下所示。

```
ubr924-ddd5#sh ver Cisco Internetwork Operating System Software IOS (tm) 920 Software (UBR920-
K1V4Y556I-M), Version 12.1(5)T4, RELEASE SOFTWARE (fc1) TAC Support: http://www.cisco.com/pcgi-
bin/ibld/view.pl?i=support Copyright (c) 1986-2001 by cisco Systems, Inc. Compiled Fri 02-Feb-01
10:55 by ccai Image text-base: 0x800100A0, data-base: 0x806DB770 ROM: System Bootstrap, Version
12.0(6r)T3, RELEASE SOFTWARE (fc1) ROM: 920 Software (UBR920-K1V4Y556I-M), Version 12.1(5)T4,
RELEASE SOFTWARE (fc1) ubr924-ddd5 uptime is 2 hours, 1 minute System returned to ROM by reload
at 12:45:25 - Fri Feb 23 2001 System restarted at 12:46:07 - Fri Feb 23 2001 System image file
is "flash:ubr920-k1v4y556i-mz.121-5.T4" cisco uBR920 CM (MPC850) processor (revision 4.d) with
15872K/1024K bytes of memory. Processor board ID FAA0444Q14Z Bridging software. 1 Ethernet/IEEE
802.3 interface(s) 1 Cable Modem network interface(s) 3968K bytes of processor board System
flash (Read/Write) 1536K bytes of processor board Boot flash (Read/Write) Configuration register
is 0x2102 ubr924-b5db#show ver Cisco Internetwork Operating System Software IOS (tm) 920
Software (UBR920-K1V4Y556I-M), Version 12.1(5)T4, RELEASE SOFTWARE (fc1) TAC Support:
http://www.cisco.com/pcgi-bin/ibld/view.pl?i=support Copyright (c) 1986-2001 by cisco Systems,
Inc. Compiled Fri 02-Feb-01 10:55 by ccai Image text-base: 0x800100A0, data-base: 0x806DB770
ROM: System Bootstrap, Version 12.0(6r)T3, RELEASE SOFTWARE (fc1) ROM: 920 Software (UBR920-
K1V4Y556I-M), Version 12.1(5)T4, RELEASE SOFTWARE (fc1) ubr924-b5db uptime is 1 hour, 53 minutes
System returned to ROM by reload at 12:55:34 - Fri Feb 23 2001 System restarted at 12:56:15 -
Fri Feb 23 2001 System image file is "flash:ubr920-k1v4y556i-mz.121-5.T4" cisco uBR920 CM
(MPC850) processor (revision 3.e) with 15872K/1024K bytes of memory. Processor board ID
FAA0422Q04F Bridging software. 1 Ethernet/IEEE 802.3 interface(s) 1 Cable Modem network
interface(s) 3968K bytes of processor board System flash (Read/Write) 1536K bytes of processor
board Boot flash (Read/Write) Configuration register is 0x2102
```

只要以下条件存在，此隧道就会显示 up/up：

- 它使用有效 IP 地址配置。
- 路由表中具有到达隧道目的地的 IP 地址的路由，没有分配到隧道远端的 IP 地址的路由。

不论您是否可以 ping 目的地地址，都应如此。不正确的静态路由或指向错误方向的默认路由将调动隧道，但隧道不会工作。

验证隧道运行的第一步是验证隧道是否开通。在两个电缆调制解调器上发出 show ip interface brief 和 show interface tunnel 0 命令。示例命令输出如下所示。

```
ubr924-ddd5#show ip interface brief Interface IP-Address OK? Method Status Protocol Ethernet0
9.9.9.9 YES manual up up Tunnel0 192.168.20.1 YES manual up up cable-modem0 10.1.4.5 YES unset
up up ubr924-ddd5#show interface tunnel 0 Tunnel0 is up, line protocol is up Hardware is Tunnel
Internet address is 192.168.20.1/24 MTU 1514 bytes, BW 9 Kbit, DLY 500000 usec, reliability
255/255, txload 1/255, rxload 1/255 Encapsulation TUNNEL, loopback not set Keepalive set (10
sec) Tunnel source 9.9.9.9 (Ethernet0), destination 11.11.11.11 Tunnel protocol/transport
GRE/IP, key disabled, sequencing disabled Checksumming of packets disabled Last input 00:15:25,
output 00:14:27, output hang never Last clearing of "show interface" counters never Queueing
strategy: fifo Output queue 0/0, 2 drops; input queue 0/75, 0 drops 5 minute input rate 0
bits/sec, 0 packets/sec 5 minute output rate 0 bits/sec, 0 packets/sec 146 packets input, 21024
bytes, 0 no buffer Received 0 broadcasts, 0 runts, 0 giants, 0 throttles 0 input errors, 0 CRC,
0 frame, 0 overrun, 0 ignored, 0 abort 172 packets output, 57392 bytes, 0 underruns 0 output
errors, 0 collisions, 0 interface resets 0 output buffer failures, 0 output buffers swapped out
ubr924-b5db#show ip interface brief Interface IP-Address OK? Method Status Protocol Ethernet0
11.11.11.11 YES manual up up Tunnel0 192.168.20.2 YES manual up up cable-modem0 10.1.4.3 YES
NVRAM up up ubr924-b5db#show interface tunnel 0 Tunnel0 is up, line protocol is up Hardware is
Tunnel Internet address is 192.168.20.2/24 MTU 1514 bytes, BW 9 Kbit, DLY 500000 usec,
reliability 255/255, txload 1/255, rxload 1/255 Encapsulation TUNNEL, loopback not set Keepalive
set (10 sec) Tunnel source 11.11.11.11 (Ethernet0), destination 9.9.9.9 Tunnel
protocol/transport GRE/IP, key disabled, sequencing disabled Checksumming of packets disabled
Last input 00:16:42, output 00:17:40, output hang never Last clearing of "show interface"
counters never Queueing strategy: fifo Output queue 0/0, 5 drops; input queue 0/75, 0 drops 5
minute input rate 0 bits/sec, 0 packets/sec 5 minute output rate 0 bits/sec, 0 packets/sec 118
packets input, 19144 bytes, 0 no buffer Received 0 broadcasts, 0 runts, 0 giants, 0 throttles 0
input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort 164 packets output, 49624 bytes, 0
underruns 0 output errors, 0 collisions, 0 interface resets 0 output buffer failures, 0 output
buffers swapped out
```

验证此隧道的工作是 ping 隧道目标 IP 地址。这只会验证 IP 连接，而不会验证通道的实际运行情况

。

```
From ubr924-ddd5 we ping 11.11.11.11
ubr924-ddd5#ping 11.11.11.11 Type escape sequence to abort. Sending 5, 100-byte ICMP Echos to
11.11.11.11, timeout is 2 seconds: !!!!! Success rate is 100 percent (5/5), round-trip
min/avg/max = 12/14/17 ms ubr924-ddd5#
```

从 ubr924-b5db 目标地址 9.9.9.9 Ping。

```
ubr924-b5db#ping 9.9.9.9 Type escape sequence to abort. Sending 5, 100-byte ICMP Echos to
9.9.9.9, timeout is 2 seconds: !!!!! Success rate is 100 percent (5/5), round-trip min/avg/max =
12/14/16 ms ubr924-b5db#
```

要验证此隧道是否能工作，请发出 **show ip route x.x.x.x** 命令，其中 **x.x.x.x** 是分配给此隧道远端的 IP 地址。在这种情况下，它是远端路由器的环回地址。如果显示的唯一路由是对隧道接口，那么到该地址的 ping 将证明此隧道会工作。

如果有 IP 编制机制，反向穿过网络通告路由回通道分段，则应该是有一个以上的路由到达通道接口的远端如果那是实际情形，则很难检验隧道是够正在运行。通常，在这种情况下，您不会想将路由复制到隧道网络。应当由网络的路由协议采取措施，防止路由通告。如果隧道被用来传输来自 IP 的不同协议的数据流，则应使用同一个基本验证方法。

```
From ubr924-ddd5 we get
ubr924-ddd5#show ip route 192.168.20.2 Routing entry for 192.168.20.0/24 Known via "connected",
distance 0, metric 0 (connected, via interface) Routing Descriptor Blocks: * directly connected,
via Tunnel0 Route metric is 0, traffic share count is 1 From ubr924-b5db we get ubr924-b5db#show
ip route 192.168.20.1 Routing entry for 192.168.20.0/24 Known via "connected", distance 0,
metric 0 (connected, via interface) Routing Descriptor Blocks: * directly connected, via Tunnel0
Route metric is 0, traffic share count is 1
```

验证 PC1 能访问 PC2 并且反之亦然，请在有线调制解调器上执行扩展的 ping，同时也从 PC 执行 ping。

将 ping 从 ubr924-b5db 以太网接口 (11.11.11.11) 扩展到 ubr924-ddd5 以太网接口 (9.9.9.9)。

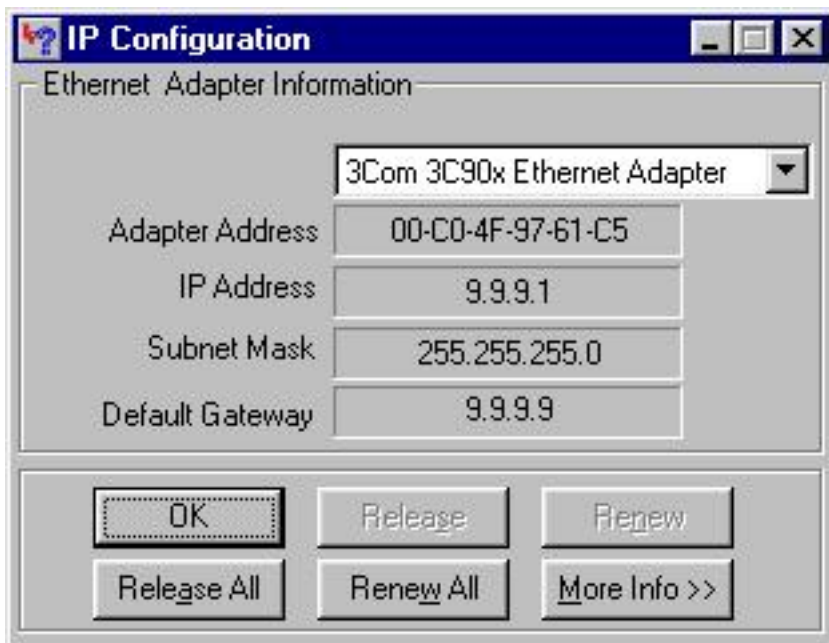
```
ubr924-b5db#ping ip Target IP address: 9.9.9.9 !--- ubr924-ddd5 Ethernet's IP address. Repeat
count [5]: Datagram size [100]: Timeout in seconds [2]: Extended commands [n]: y Source address
or interface: 11.11.11.11 !--- ubr924-b5db Ethernet's IP address. Type of service [0]: Set DF
bit in IP header? [no]: Validate reply data? [no]: Data pattern [0xABCD]: Loose, Strict, Record,
Timestamp, Verbose[none]: Sweep range of sizes [n]: Type escape sequence to abort. Sending 5,
100-byte ICMP Echos to 9.9.9.9, timeout is 2 seconds: !!!!! Success rate is 100 percent (5/5),
round-trip min/avg/max = 12/16/28 ms ubr924-b5db#
```

执行相反步骤测试另一侧的连接。

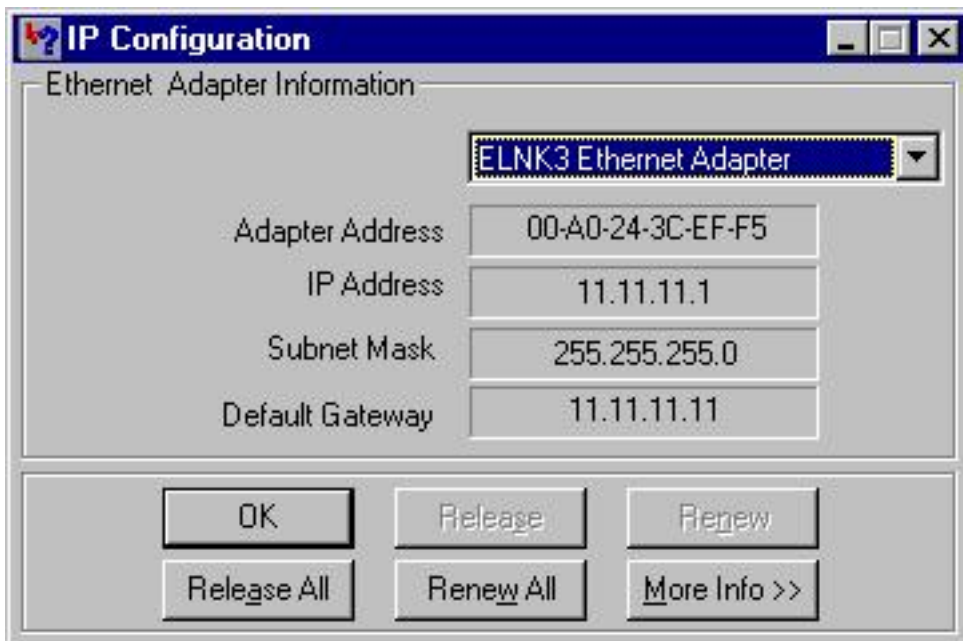
```
ubr924-ddd5#ping ip Target IP address: 11.11.11.11 !--- ubr924-b5db Ethernet's IP address.
Repeat count [5]: Datagram size [100]: Timeout in seconds [2]: Extended commands [n]: y Source
address or interface: 9.9.9.9 !--- ubr924-ddd5 Ethernet's IP address. Type of service [0]: Set
DF bit in IP header? [no]: Validate reply data? [no]: Data pattern [0xABCD]: Loose, Strict,
Record, Timestamp, Verbose[none]: Sweep range of sizes [n]: Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 11.11.11.11, timeout is 2 seconds: !!!!! Success rate is 100
percent (5/5), round-trip min/avg/max = 12/14/16 ms ubr924-ddd5#
```

最终测试是从 PC1 ping 到 PC2，以及从 PC2 ping 到 PC1。

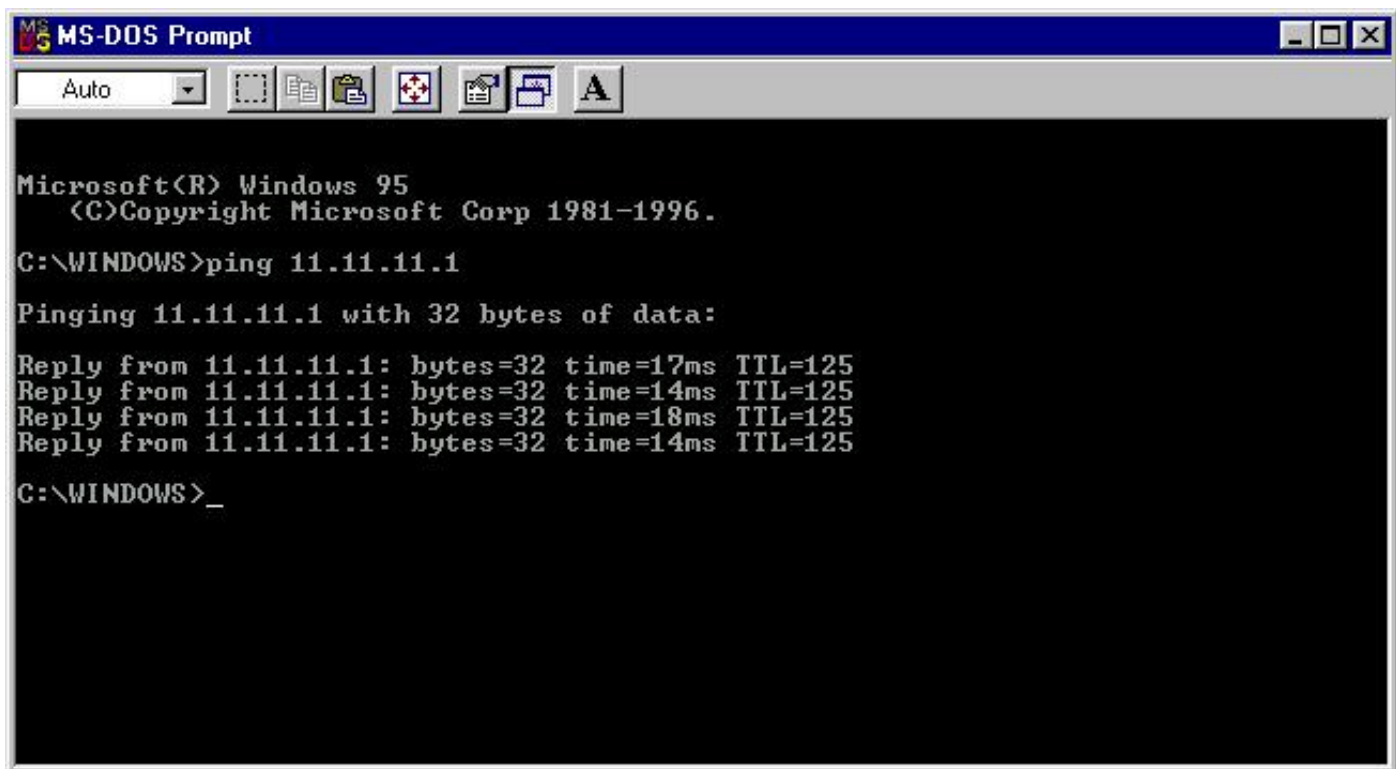
PC1 的 IP 地址为 9.9.9.1。



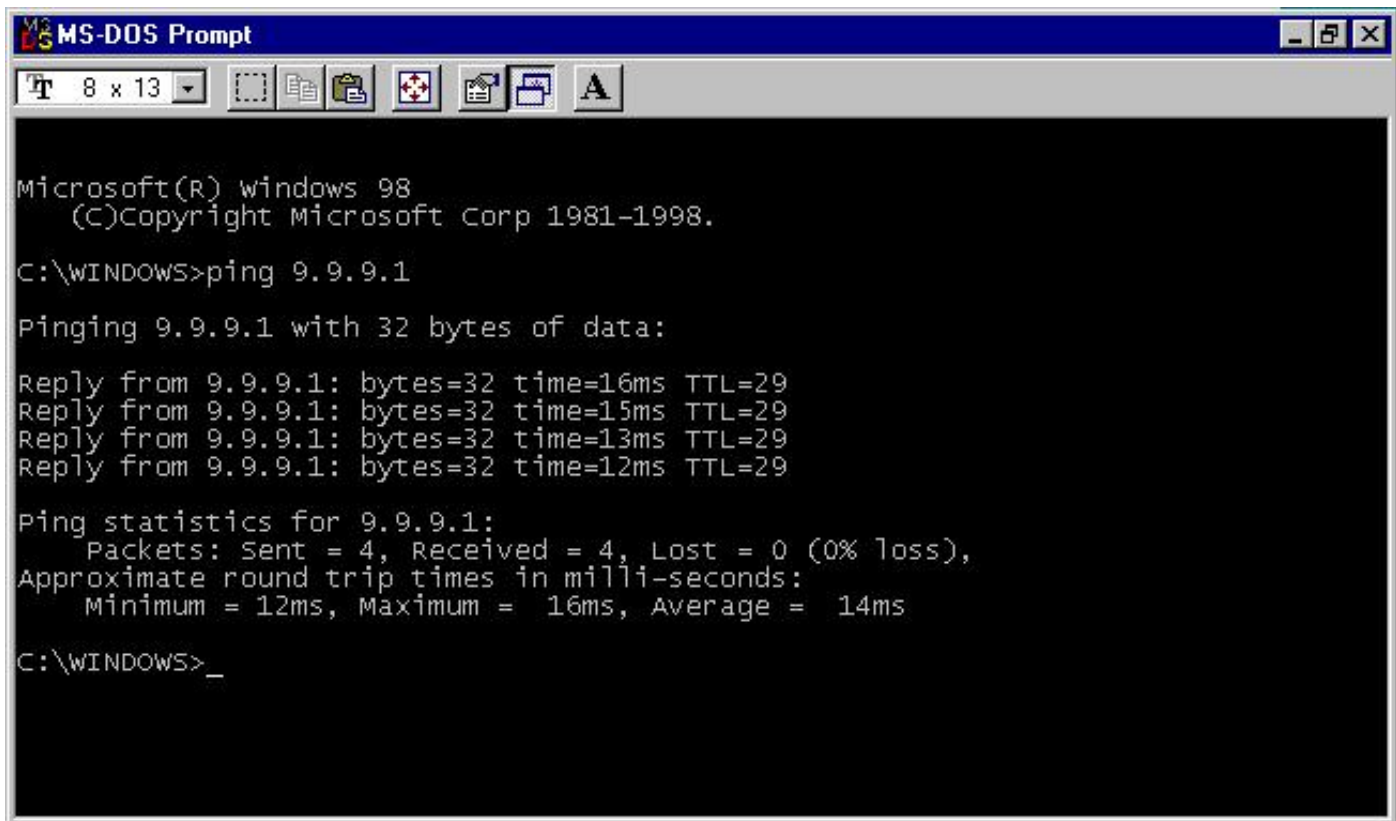
PC2 的 IP 地址是 11.11.11.1。



从 PC1 ping PC2。



从 PC2 ping PC1。



The image shows a screenshot of the MS-DOS Prompt window. The title bar reads "MS-DOS Prompt". The window contains the following text:

```
Microsoft(R) windows 98
(C)Copyright Microsoft Corp 1981-1998.

C:\WINDOWS>ping 9.9.9.1

Pinging 9.9.9.1 with 32 bytes of data:

Reply from 9.9.9.1: bytes=32 time=16ms TTL=29
Reply from 9.9.9.1: bytes=32 time=15ms TTL=29
Reply from 9.9.9.1: bytes=32 time=13ms TTL=29
Reply from 9.9.9.1: bytes=32 time=12ms TTL=29

Ping statistics for 9.9.9.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 12ms, Maximum = 16ms, Average = 14ms

C:\WINDOWS>_
```

[故障排除](#)

目前没有针对此配置的故障排除信息。

[相关信息](#)

- [故障排除 UBR 电缆调制解调器不上线的问题](#)
- [技术支持 - Cisco Systems](#)