

# Risoluzione dei problemi relativi a DHCP su Nexus 9000

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## Introduzione

In questo documento viene descritta la procedura per verificare la configurazione corretta di un agente di inoltro DHCP su un Nexus 9000.

## Prerequisiti

### Requisiti

Cisco NXOS® raccomanda la conoscenza dei seguenti argomenti:

- DHCP
- ELAM
- Etanalizzatore

### Componenti usati

Il documento è limitato a hardware specifico, ad esempio Nexus 9000

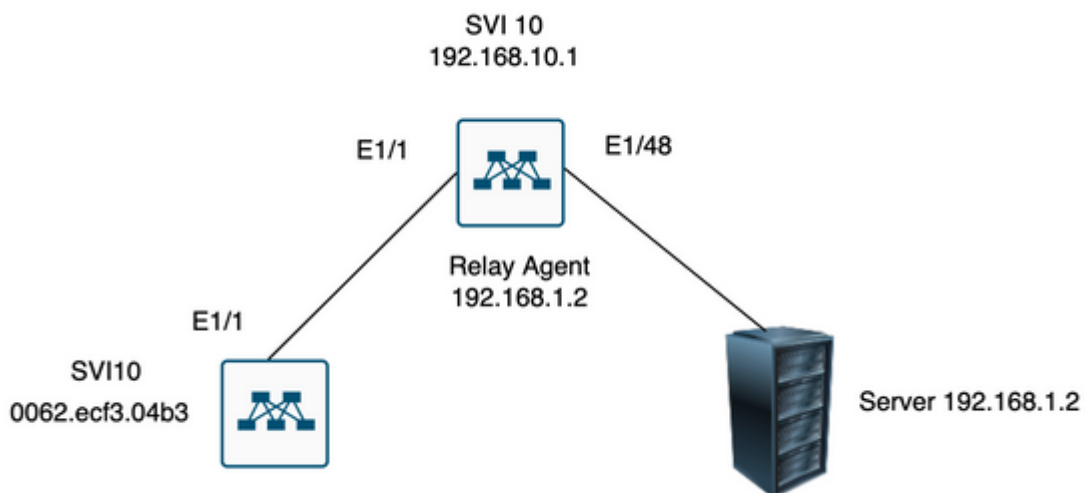
Le informazioni discusse in questo documento fanno riferimento a dispositivi usati in uno specifico ambiente di emulazione. Su tutti i dispositivi menzionati nel documento la configurazione è stata ripristinata ai valori predefiniti. Se la rete è operativa, valutare attentamente eventuali conseguenze derivanti dall'uso dei comandi.

## Premesse

È possibile configurare il dispositivo in modo che esegua un agente di inoltro DHCP, che inoltra i pacchetti DHCP tra i client e i server. Questa funzionalità è utile quando i client e i server non si trovano nella stessa subnet fisica. Gli agenti di inoltro ricevono messaggi DHCP e quindi generano un nuovo messaggio DHCP da inviare su un'altra interfaccia.

## Topologia

Gli switch Nexus funzionano come relay DHCP per fornire un IP al client dal server.



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## Verifica

1) Verificare la configurazione del client (nessun indirizzo IP assegnato)

```
Client# show interface vlan 10
Vlan10 is up, line protocol is up, autostate enabled
Hardware is EtherSVI, address is 0062.ecf3.04b3
MTU 1500 bytes, BW 1000000 Kbit, DLY 10 usec,
reliability 255/255, txload 1/255, rxload 1/255
Encapsulation ARPA, loopback not set
Keepalive not supported
ARP type: ARPA
Last clearing of "show interface" counters never
L3 in Switched:
ucast: 0 pkts, 0 bytes
```

2) Verificare la configurazione DHCP

```
Switch1# show run dhcp
```

```
ip dhcp snooping
service dhcp
ip dhcp relay
ipv6 dhcp relay
```

```
interface Vlan10
 ip dhcp relay address 192.168.1.2
 ip dhcp snooping vlan 1,10
```

### 3) Verificare la connettività al server

```
Switch1# ping 192.168.1.2
PING 192.168.1.2 (192.168.1.2): 56 data bytes
64 bytes from 192.168.1.2: icmp_seq=0 ttl=253 time=1.678 ms
64 bytes from 192.168.1.2: icmp_seq=1 ttl=253 time=1.329 ms
64 bytes from 192.168.1.2: icmp_seq=2 ttl=253 time=1.742 ms
64 bytes from 192.168.1.2: icmp_seq=3 ttl=253 time=1.382 ms
64 bytes from 192.168.1.2: icmp_seq=4 ttl=253 time=1.241 ms
--- 192.168.1.2 ping statistics ---
5 packets transmitted, 5 packets received, 0.00% packet loss
round-trip min/avg/max = 1.241/1.474/1.742 ms
Switch1#
```

```
Switch1# show ip route 192.168.1.2
IP Route Table for VRF "default"
 '*' denotes best ucast next-hop
 '**' denotes best mcast next-hop
 '[x/y]' denotes [preference/metric]
 '%<string>' in via output denotes VRF <string>
192.168.1.2/32, ubest/mbest: 1/0, attached
 *via 192.168.1.2, Eth1/48, [250/0], 02:13:58, am
Switch1#
```

### 4) Andare avanti per esaminare le statistiche del DHCP per verificare che le informazioni siano state inviate correttamente.

```
Switch1# show ip dhcp relay statistics interface vlan 10
```

```
-----
Message Type Rx Tx Drops
-----
```

```
Discover 1 1 0
Offer 1 1 0
Request(*) 1 1 0
Ack 1 1 0
Release(*) 0 0 0
Decline 0 0 0
Inform(*) 0 0 0
Nack 0 0 0
-----
```

```
Total 4 4 0
-----
```

```
DHCP server stats:
```

```
-----
Server Vrf Request Response
-----
```

```
192.168.1.2 2 2
```

```
-----  
DHCP L3 FWD:  
Total Packets Received : 0  
Total Packets Forwarded : 0  
Total Packets Dropped : 0  
Non DHCP:  
Total Packets Received : 0  
Total Packets Forwarded : 0  
Total Packets Dropped : 0  
DROP:  
DHCP Relay not enabled : 0  
Invalid DHCP message type : 0  
Interface error : 0  
Tx failure towards server : 0  
Tx failure towards client : 0  
Unknown output interface : 0  
Unknown vrf or interface for server : 0  
Max hops exceeded : 0  
Option 82 validation failed : 0  
Packet Malformed : 0  
DHCP Request dropped on MCT : 0  
Relay Trusted port not configured : 0  
* - These counters show correct value when switch  
receives DHCP request packet with destination ip as broadcast  
address. If request is unicast it is being HW switched  
Switch1#
```

```
Switch1# show ip dhcp global statistics  
Packets processed 130  
Packets received through cfsoe 0  
Packets forwarded 24  
Packets forwarded on cfsoe 0  
Total packets dropped 106  
Packets dropped from untrusted ports 0  
Packets dropped due to MAC address check failure 0  
Packets dropped due to Option 82 insertion failure 0  
Packets dropped due to o/p intf unknown 0  
Packets dropped which were unknown 0  
Packets dropped due to no trusted ports 106  
Packets dropped due to dhcp relay not enabled 0  
Packets dropped due to no binding entry 0  
Packets dropped due to interface error/no interface 0  
Packets dropped due to max hops exceeded 0  
Packets dropped due to Queue full 0  
Switch1#
```

## Risoluzione dei problemi

1) Verificare che le statistiche siano corrette eseguendo un analizzatore di etalità.

```
Switch1# ethanalyzer local interface inband display-filter bootp limit-captured-frames 0  
Capturing on inband
```

```
2023-07-18 21:30:01.935789 0.0.0.0 -> 255.255.255.255 DHCP DHCP Discover - Transaction ID 0x64b6400b
```

```
2023-07-18 21:30:01.937789 192.168.10.1 -> 192.168.1.2 DHCP DHCP Discover - Transaction ID 0x64b6400b
2023-07-18 21:30:03.938596 192.168.1.2 -> 192.168.10.1 DHCP DHCP Offer - Transaction ID 0x64b6400b
2023-07-18 21:30:03.938659 192.168.1.2 -> 192.168.10.1 DHCP DHCP Offer - Transaction ID 0x64b6400b
2023-07-18 21:30:03.940103 192.168.10.1 -> 255.255.255.255 DHCP DHCP Offer - Transaction ID 0x64b6400b
2023-07-18 21:30:07.939208 0.0.0.0 -> 255.255.255.255 DHCP DHCP Request - Transaction ID 0x64b6400b
2023-07-18 21:30:07.941220 192.168.10.1 -> 192.168.1.2 DHCP DHCP Request - Transaction ID 0x64b6400b
2023-07-18 21:30:07.941848 192.168.1.2 -> 192.168.10.1 DHCP DHCP ACK - Transaction ID 0x64b6400b
2023-07-18 21:30:07.941897 192.168.1.2 -> 192.168.10.1 DHCP DHCP ACK - Transaction ID 0x64b6400b
2023-07-18 21:30:07.942693 192.168.10.1 -> 255.255.255.255 DHCP DHCP ACK - Transaction ID 0x64b6400b
```

2) Ethalyzer ha un'opzione di dettaglio che fornisce informazioni aggiuntive, incluse le intestazioni del traffico acquisito.

```
ethalyzer local interface inband display-filter "((eth.addr==<MAC_address> and bootp ))" limit-capture
```

3) L'aggiunta del flag di dettaglio nella cattura dell'analizzatore di etalità fornisce ulteriori dettagli sulla comunicazione tra il client e il server.

[1] L'agente di inoltro riceve una ricerca DHCP dal client come trasmissione:

MAC di origine è MAC client: 00:62:ec:f3:04:b3

Il MAC di destinazione è trasmesso: ff:ff:ff:ff:ff:ff

Poiché il client non dispone di un indirizzo IP, l'indirizzo IP di origine è 0.0.0.0

IP origine: 0.0.0.0

IP di destinazione : 255.255.255.255

Porta di origine: bootpc (68)

Porta di destinazione: bootps (67)

Tipo di messaggio: Richiesta di avvio (1)

Tipo di messaggio DHCP = Individuazione DHCP

Frame 14 (358 bytes on wire, 358 bytes captured)

Arrival Time: Jul 19, 2023 21:53:29.339064000

[Time delta from previous captured frame: 0.096490000 seconds]

[Time delta from previous displayed frame: 2.618117000 seconds]

[Time since reference or first frame: 2.618117000 seconds]

Frame Number: 14

Frame Length: 358 bytes

Capture Length: 358 bytes

[Frame is marked: False]

[Protocols in frame: eth:vlan:ip:udp:bootp]

Ethernet II, Src: 00:62:ec:f3:04:b3 (00:62:ec:f3:04:b3), Dst: ff:ff:ff:ff:ff:ff (ff:ff:ff:ff:ff:ff)

Destination: ff:ff:ff:ff:ff:ff (ff:ff:ff:ff:ff:ff)

Address: ff:ff:ff:ff:ff:ff (ff:ff:ff:ff:ff:ff)

.... 1 .... = IG bit: Group address (multicast/broadcast)

.... .1. .... = LG bit: Locally administered address (this is NOT the factory default)

Source: 00:62:ec:f3:04:b3 (00:62:ec:f3:04:b3)

Address: 00:62:ec:f3:04:b3 (00:62:ec:f3:04:b3)

.... 0 .... = IG bit: Individual address (unicast)

.... .0. .... = LG bit: Globally unique address (factory default)

Type: 802.1Q Virtual LAN (0x8100)

802.1Q Virtual LAN, PRI: 0, CFI: 0, ID: 10

000. .... = Priority: 0

...0 .... = CFI: 0  
.... 0000 0000 1010 = ID: 10  
Type: IP (0x0800)  
Internet Protocol, Src: 0.0.0.0 (0.0.0.0), Dst: 255.255.255.255 (255.255.255.255)  
Version: 4  
Header length: 20 bytes  
Differentiated Services Field: 0x00 (DSCP 0x00: Default; ECN: 0x00)  
0000 00.. = Differentiated Services Codepoint: Default (0x00)  
.... ..0. = ECN-Capable Transport (ECT): 0  
.... ...0 = ECN-CE: 0  
Total Length: 340  
Identification: 0x0000 (0)  
Flags: 0x00  
0.. = Reserved bit: Not Set  
.0. = Do not fragment: Not Set  
..0 = More fragments: Not Set  
Fragment offset: 0  
Time to live: 255  
Protocol: UDP (0x11)  
Header checksum: 0xba99 [correct]  
[Good: True]  
[Bad : False]  
Source: 0.0.0.0 (0.0.0.0)  
Destination: 255.255.255.255 (255.255.255.255)  
User Datagram Protocol, Src Port: bootpc (68), Dst Port: bootps (67)  
Source port: bootpc (68)  
Destination port: bootps (67)  
Length: 320  
Checksum: 0x2bbb [validation disabled]  
[Good Checksum: False]  
[Bad Checksum: False]  
Bootstrap Protocol  
Message type: Boot Request (1)  
Hardware type: Ethernet  
Hardware address length: 6  
Hops: 0  
Transaction ID: 0x64b14fa7  
Seconds elapsed: 0  
Bootp flags: 0x8000 (Broadcast)  
1... .... = Broadcast flag: Broadcast  
.000 0000 0000 0000 = Reserved flags: 0x0000  
Client IP address: 0.0.0.0 (0.0.0.0)  
Your (client) IP address: 0.0.0.0 (0.0.0.0)  
Next server IP address: 0.0.0.0 (0.0.0.0)  
Relay agent IP address: 0.0.0.0 (0.0.0.0)  
Client MAC address: 00:62:ec:f3:04:b3 (00:62:ec:f3:04:b3)  
Client hardware address padding: 00000000000000000000  
Server host name not given  
Boot file name not given  
Magic cookie: (OK)  
Option: (t=53,l=1) DHCP Message Type = DHCP Discover  
Option: (53) DHCP Message Type  
Length: 1  
Value: 01  
Option: (t=61,l=18) Client identifier  
Option: (61) Client identifier  
Length: 18  
Value: 0046444F3230323431435548566C616E3130  
Option: (t=51,l=4) IP Address Lease Time = 2 hours  
Option: (51) IP Address Lease Time  
Length: 4  
Value: 00001C20

```

Option: (t=60,l=19) Vendor class identifier = "Cisco NXOS® N9K-C9372PX-E"
Option: (60) Vendor class identifier
Length: 19
Value: 436973636F204E394B2D433933373250582D45
Option: (t=43,l=8) Vendor-Specific Information
Option: (43) Vendor-Specific Information
Length: 8
Value: F1060062ECF304AC
Option: (t=55,l=8) Parameter Request List
Option: (55) Parameter Request List
Length: 8
Value: 010306070C424396
1 = Subnet Mask
3 = Router
6 = Domain Name Server
7 = Log Server
12 = Host Name
66 = TFTP Server Name
67 = Bootfile name
150 = TFTP server address
End Option
Padding
Frame 15 (354 bytes on wire, 354 bytes captured)
Arrival Time: Jul 19, 2023 21:53:29.340263000
[Time delta from previous captured frame: 0.001199000 seconds]
[Time delta from previous displayed frame: 0.001199000 seconds]
[Time since reference or first frame: 2.619316000 seconds]
Frame Number: 15
Frame Length: 354 bytes
Capture Length: 354 bytes
[Frame is marked: False]
[Protocols in frame: eth:ip:udp:bootp]
Ethernet II, Src: 6c:31:0e:a3:0c:57 (6c:31:0e:a3:0c:57), Dst: c4:c6:03:09:cf:47 (c4:c6:03:09:cf:47)
Destination: c4:c6:03:09:cf:47 (c4:c6:03:09:cf:47)
Address: c4:c6:03:09:cf:47 (c4:c6:03:09:cf:47)
.... 0 .... = IG bit: Individual address (unicast)
.... 0. .... = LG bit: Globally unique address (factory default)
Source: 6c:31:0e:a3:0c:57 (6c:31:0e:a3:0c:57)
Address: 6c:31:0e:a3:0c:57 (6c:31:0e:a3:0c:57)
.... 0 .... = IG bit: Individual address (unicast)
.... 0. .... = LG bit: Globally unique address (factory default)
Type: IP (0x0800)

```

[2] L'agente di inoltro invia al server un messaggio di individuazione utilizzando unicast.

MAC di origine è nexus MAC: 6c:31:0e:a3:0c:57

L'indirizzo MAC di destinazione è MAC server DHCP: c4:c6:03:09:cf:47

L'indirizzo IP di origine è Nexus IP su SVI10: 192.168.10.1

L'IP di destinazione è l'IP del server DHCP: 192.168.1.2

Porta di origine: bootps (67)

Porta di destinazione: bootps (67)

Indirizzo MAC del client: 00:62:ec:f3:04:b3 <<<<< L'indirizzo MAC del client è incluso nell'intestazione UDP/DHCP

Tipo di messaggio: Richiesta di avvio (1)

Tipo di messaggio DHCP = Individuazione DHCP

```

Frame 15 (354 bytes on wire, 354 bytes captured)
Arrival Time: Jul 19, 2023 21:53:29.340263000
[Time delta from previous captured frame: 0.001199000 seconds]

```

[Time delta from previous displayed frame: 0.001199000 seconds]  
[Time since reference or first frame: 2.619316000 seconds]  
Frame Number: 15  
Frame Length: 354 bytes  
Capture Length: 354 bytes  
[Frame is marked: False]  
[Protocols in frame: eth:ip:udp:bootp]  
Ethernet II, Src: 6c:31:0e:a3:0c:57 (6c:31:0e:a3:0c:57), Dst: c4:c6:03:09:cf:47 (c4:c6:03:09:cf:47)  
Destination: c4:c6:03:09:cf:47 (c4:c6:03:09:cf:47)  
Address: c4:c6:03:09:cf:47 (c4:c6:03:09:cf:47)  
.... 0 = IG bit: Individual address (unicast)  
.... 0. = LG bit: Globally unique address (factory default)  
Source: 6c:31:0e:a3:0c:57 (6c:31:0e:a3:0c:57)  
Address: 6c:31:0e:a3:0c:57 (6c:31:0e:a3:0c:57)  
.... 0 = IG bit: Individual address (unicast)  
.... 0. = LG bit: Globally unique address (factory default)  
Type: IP (0x0800)

Internet Protocol, Src: 192.168.10.1 (192.168.10.1), Dst: 192.168.1.2 (192.168.1.2)  
Version: 4  
Header length: 20 bytes  
Differentiated Services Field: 0x00 (DSCP 0x00: Default; ECN: 0x00)  
0000 00.. = Differentiated Services Codepoint: Default (0x00)  
.... 0. = ECN-Capable Transport (ECT): 0  
.... 0 = ECN-CE: 0  
Total Length: 340  
Identification: 0xefab (61355)  
Flags: 0x00  
0.. = Reserved bit: Not Set  
.0. = Do not fragment: Not Set  
..0 = More fragments: Not Set  
Fragment offset: 0  
Time to live: 255  
Protocol: UDP (0x11)  
Header checksum: 0x3e99 [correct]  
[Good: True]  
[Bad : False]  
Source: 192.168.10.1 (192.168.10.1)  
Destination: 192.168.1.2 (192.168.1.2)  
User Datagram Protocol, Src Port: bootps (67), Dst Port: bootps (67)  
Source port: bootps (67)  
Destination port: bootps (67)  
Length: 320  
Checksum: 0xd4bc [validation disabled]  
[Good Checksum: False]  
[Bad Checksum: False]  
Bootstrap Protocol  
Message type: Boot Request (1)  
Hardware type: Ethernet  
Hardware address length: 6  
Hops: 1  
Transaction ID: 0x64b14fa7  
Seconds elapsed: 0  
Bootp flags: 0x8000 (Broadcast)  
1... .. = Broadcast flag: Broadcast  
.000 0000 0000 0000 = Reserved flags: 0x0000  
Client IP address: 0.0.0.0 (0.0.0.0)  
Your (client) IP address: 0.0.0.0 (0.0.0.0)  
Next server IP address: 0.0.0.0 (0.0.0.0)  
Relay agent IP address: 192.168.10.1 (192.168.10.1)  
Client MAC address: 00:62:ec:f3:04:b3 (00:62:ec:f3:04:b3)



Client hardware address padding: 00000000000000000000  
Server host name not given  
Boot file name not given  
Magic cookie: (OK)  
Option: (t=53,l=1) DHCP Message Type = DHCP Discover  
Option: (53) DHCP Message Type  
Length: 1  
Value: 01  
Option: (t=61,l=18) Client identifier  
Option: (61) Client identifier  
Length: 18  
Value: 0046444F3230323431435548566C616E3130  
Option: (t=51,l=4) IP Address Lease Time = 2 hours  
Option: (51) IP Address Lease Time  
Length: 4  
Value: 00001C20  
Option: (t=60,l=19) Vendor class identifier = "Cisco NXOS® N9K-C9372PX-E"  
Option: (60) Vendor class identifier  
Length: 19  
Value: 436973636F204E394B2D433933373250582D45  
Option: (t=43,l=8) Vendor-Specific Information  
Option: (43) Vendor-Specific Information  
Length: 8  
Value: F1060062ECF304AC  
Option: (t=55,l=8) Parameter Request List  
Option: (55) Parameter Request List  
Length: 8  
Value: 010306070C424396  
1 = Subnet Mask  
3 = Router  
6 = Domain Name Server  
7 = Log Server  
12 = Host Name  
66 = TFTP Server Name  
67 = Bootfile name  
150 = TFTP server address  
End Option  
Padding

[3] Il server risponde all'offerta unicast all'agente di inoltra.  
L'indirizzo MAC di origine è MAC server DHCP: c4:c6:03:09:cf:47  
MAC di destinazione è Nexus MAC: 6c:31:0e:a3:0c:57  
L'indirizzo IP di origine è il server DHCP: 192.168.1.2  
Destinazione IP Nexus IP su SVI10: 192.168.10.1  
Porta di origine: bootps (67)  
Porta di destinazione: bootps (67)  
Tipo di messaggio: Risposta di avvio (2)  
Indirizzo IP (client): 192.168.10.19 (192.168.10.19) <<<<< Il pacchetto dell'offerta include l'indirizzo IP da assegnare al client  
Indirizzo MAC del client: 00:62:ec:f3:04:b3 (00:62:ec:f3:04:b3) <<<< Indirizzo MAC del client  
Tipo di messaggio DHCP = Offerta DHCP

Frame 27 (348 bytes on wire, 348 bytes captured)  
Arrival Time: Jul 19, 2023 21:53:31.340920000  
[Time delta from previous captured frame: 0.097549000 seconds]  
[Time delta from previous displayed frame: 2.000657000 seconds]  
[Time since reference or first frame: 4.619973000 seconds]  
Frame Number: 27  
Frame Length: 348 bytes

Capture Length: 348 bytes  
[Frame is marked: False]  
[Protocols in frame: eth:ip:udp:bootp]  
Ethernet II, Src: c4:c6:03:09:cf:47 (c4:c6:03:09:cf:47), Dst: 6c:31:0e:a3:0c:57 (6c:31:0e:a3:0c:57)  
Destination: 6c:31:0e:a3:0c:57 (6c:31:0e:a3:0c:57)  
Address: 6c:31:0e:a3:0c:57 (6c:31:0e:a3:0c:57)  
.... 0 .... = IG bit: Individual address (unicast)  
.... 0. .... = LG bit: Globally unique address (factory default)  
Source: c4:c6:03:09:cf:47 (c4:c6:03:09:cf:47)  
Address: c4:c6:03:09:cf:47 (c4:c6:03:09:cf:47)  
.... 0 .... = IG bit: Individual address (unicast)  
.... 0. .... = LG bit: Globally unique address (factory default)  
Type: IP (0x0800)  
Internet Protocol, Src: 192.168.1.2 (192.168.1.2), Dst: 192.168.10.1 (192.168.10.1)  
Version: 4  
Header length: 20 bytes  
Differentiated Services Field: 0x00 (DSCP 0x00: Default; ECN: 0x00)  
0000 00.. = Differentiated Services Codepoint: Default (0x00)  
.... 0. = ECN-Capable Transport (ECT): 0  
.... 0 = ECN-CE: 0  
Total Length: 334  
Identification: 0x0014 (20)  
Flags: 0x00  
0.. = Reserved bit: Not Set  
.0. = Do not fragment: Not Set  
..0 = More fragments: Not Set  
Fragment offset: 0  
Time to live: 254  
Protocol: UDP (0x11)  
Header checksum: 0x2f37 [correct]  
[Good: True]  
[Bad : False]  
Source: 192.168.1.2 (192.168.1.2)  
Destination: 192.168.10.1 (192.168.10.1)  
User Datagram Protocol, Src Port: bootps (67), Dst Port: bootps (67)  
Source port: bootps (67)  
Destination port: bootps (67)  
Length: 314  
Checksum: 0x0500 [validation disabled]  
[Good Checksum: False]  
[Bad Checksum: False]  
Bootstrap Protocol  
Message type: Boot Reply (2)  
Hardware type: Ethernet  
Hardware address length: 6  
Hops: 0  
Transaction ID: 0x64b14fa7  
Seconds elapsed: 0  
Bootp flags: 0x8000 (Broadcast)  
1... .... = Broadcast flag: Broadcast  
.000 0000 0000 0000 = Reserved flags: 0x0000  
Client IP address: 0.0.0.0 (0.0.0.0)  
Your (client) IP address: 192.168.10.19 (192.168.10.19)  
Next server IP address: 0.0.0.0 (0.0.0.0)  
Relay agent IP address: 192.168.10.1 (192.168.10.1)  
Client MAC address: 00:62:ec:f3:04:b3 (00:62:ec:f3:04:b3)  
Client hardware address padding: 00000000000000000000  
Server host name not given  
Boot file name not given  
Magic cookie: (OK)  
Option: (t=53,l=1) DHCP Message Type = DHCP Offer  
Option: (53) DHCP Message Type

Length: 1  
Value: 02  
Option: (t=61,l=18) Client identifier  
Option: (61) Client identifier  
Length: 18  
Value: 0046444F3230323431435548566C616E3130  
Option: (t=54,l=4) DHCP Server Identifier = 192.168.1.2  
Option: (54) DHCP Server Identifier  
Length: 4  
Value: C0A80102  
Option: (t=51,l=4) IP Address Lease Time = 1 day  
Option: (51) IP Address Lease Time  
Length: 4  
Value: 00015180  
Option: (t=58,l=4) Renewal Time Value = 12 hours  
Option: (58) Renewal Time Value  
Length: 4  
Value: 0000A8C0  
Option: (t=59,l=4) Rebinding Time Value = 21 hours  
Option: (59) Rebinding Time Value  
Length: 4  
Value: 00012750  
Option: (t=1,l=4) Subnet Mask = 255.255.255.0  
Option: (1) Subnet Mask  
Length: 4  
Value: FFFFFFF0  
Option: (t=3,l=4) Router = 192.168.1.2  
Option: (3) Router  
Length: 4  
Value: C0A80102  
Option: (t=6,l=4) Domain Name Server = 8.8.8.8  
Option: (6) Domain Name Server  
Length: 4  
Value: 08080808  
End Option

[4] L'agente di inoltro inoltra l'offerta DHCP dal server DHCP utilizzando il broadcast. Questo pacchetto di broadcast viene ricevuto dalla subnet, ma include l'indirizzo MAC del client, quindi solo il proprietario dell'indirizzo MAC elabora il pacchetto.

MAC di origine è nexus MAC: 6c:31:0e:a3:0c:57

Il MAC di destinazione è trasmesso: ff:ff:ff:ff:ff

L'indirizzo IP di origine è Nexus IP su SVI10: 192.168.10.1

L'IP di destinazione è l'indirizzo di broadcast: 255.255.255.255

Porta di origine: bootps (67)

Porta di destinazione: bootpc (68)

Tipo di messaggio: Risposta di avvio (2)

Indirizzo IP (client): 192.168.10.19

Indirizzo MAC client: 00:62:ec:f3:04:b3

Tipo di messaggio DHCP = Offerta DHCP

Frame 28 (348 bytes on wire, 348 bytes captured)

Arrival Time: Jul 19, 2023 21:53:31.341325000

[Time delta from previous captured frame: 0.000405000 seconds]

[Time delta from previous displayed frame: 0.000405000 seconds]

[Time since reference or first frame: 4.620378000 seconds]

Frame Number: 28

Frame Length: 348 bytes

Capture Length: 348 bytes  
[Frame is marked: False]  
[Protocols in frame: eth:ip:udp:bootp]  
Ethernet II, Src: 6c:31:0e:a3:0c:57 (6c:31:0e:a3:0c:57), Dst: ff:ff:ff:ff:ff:ff (ff:ff:ff:ff:ff:ff)  
Destination: ff:ff:ff:ff:ff:ff (ff:ff:ff:ff:ff:ff)  
Address: ff:ff:ff:ff:ff:ff (ff:ff:ff:ff:ff:ff)  
.... 1 = IG bit: Group address (multicast/broadcast)  
.... 1. = LG bit: Locally administered address (this is NOT the factory default)  
Source: 6c:31:0e:a3:0c:57 (6c:31:0e:a3:0c:57)  
Address: 6c:31:0e:a3:0c:57 (6c:31:0e:a3:0c:57)  
.... 0 = IG bit: Individual address (unicast)  
.... 0. = LG bit: Globally unique address (factory default)  
Type: IP (0x0800)  
Internet Protocol, Src: 192.168.10.1 (192.168.10.1), Dst: 255.255.255.255 (255.255.255.255)  
Version: 4  
Header length: 20 bytes  
Differentiated Services Field: 0x00 (DSCP 0x00: Default; ECN: 0x00)  
0000 00.. = Differentiated Services Codepoint: Default (0x00)  
.... 0. = ECN-Capable Transport (ECT): 0  
.... 0 = ECN-CE: 0  
Total Length: 334  
Identification: 0x1400 (5120)  
Flags: 0x00  
0.. = Reserved bit: Not Set  
.0. = Do not fragment: Not Set  
..0 = More fragments: Not Set  
Fragment offset: 0  
Time to live: 255  
Protocol: UDP (0x11)  
Header checksum: 0xdbf5 [correct]  
[Good: True]  
[Bad : False]  
Source: 192.168.10.1 (192.168.10.1)  
Destination: 255.255.255.255 (255.255.255.255)  
User Datagram Protocol, Src Port: bootps (67), Dst Port: bootpc (68)  
Source port: bootps (67)  
Destination port: bootpc (68)  
Length: 314  
Checksum: 0xc6a8 [validation disabled]  
[Good Checksum: False]  
[Bad Checksum: False]  
Bootstrap Protocol  
Message type: Boot Reply (2)  
Hardware type: Ethernet  
Hardware address length: 6  
Hops: 1  
Transaction ID: 0x64b14fa7  
Seconds elapsed: 0  
Bootp flags: 0x8000 (Broadcast)  
1... = Broadcast flag: Broadcast  
.000 0000 0000 0000 = Reserved flags: 0x0000  
Client IP address: 0.0.0.0 (0.0.0.0)  
Your (client) IP address: 192.168.10.19 (192.168.10.19)  
Next server IP address: 0.0.0.0 (0.0.0.0)  
Relay agent IP address: 192.168.10.1 (192.168.10.1)  
Client MAC address: 00:62:ec:f3:04:b3 (00:62:ec:f3:04:b3)  
Client hardware address padding: 00000000000000000000  
Server host name not given  
Boot file name not given  
Magic cookie: (OK)  
Option: (t=53,l=1) DHCP Message Type = DHCP Offer  
Option: (53) DHCP Message Type

Length: 1  
Value: 02  
Option: (t=61,l=18) Client identifier  
Option: (61) Client identifier  
Length: 18  
Value: 0046444F3230323431435548566C616E3130  
Option: (t=54,l=4) DHCP Server Identifier = 192.168.1.2  
Option: (54) DHCP Server Identifier  
Length: 4  
Value: C0A80102  
Option: (t=51,l=4) IP Address Lease Time = 1 day  
Option: (51) IP Address Lease Time  
Length: 4  
Value: 00015180  
Option: (t=58,l=4) Renewal Time Value = 12 hours  
Option: (58) Renewal Time Value  
Length: 4  
Value: 0000A8C0  
Option: (t=59,l=4) Rebinding Time Value = 21 hours  
Option: (59) Rebinding Time Value  
Length: 4  
Value: 00012750  
Option: (t=1,l=4) Subnet Mask = 255.255.255.0  
Option: (1) Subnet Mask  
Length: 4  
Value: FFFFFFF0  
Option: (t=3,l=4) Router = 192.168.1.2  
Option: (3) Router  
Length: 4  
Value: C0A80102  
Option: (t=6,l=4) Domain Name Server = 8.8.8.8  
Option: (6) Domain Name Server  
Length: 4  
Value: 08080808  
End Option

[5] L'agente di inoltro riceve una richiesta dal client e viene trasmesso.

MAC di origine è MAC client: 00:62:ec:f3:04:b3

Il MAC di destinazione è trasmesso: ff:ff:ff:ff:ff

A questo punto, il client non ha ancora un indirizzo IP, l'IP di origine è ancora 0.0.0.0

IP origine: 0.0.0.0

IP di destinazione : 255.255.255.255

Porta di origine: bootpc (68)

Porta di destinazione: bootps (67)

Tipo di messaggio: Richiesta di avvio (1) <<<< Questo messaggio è la richiesta del client per IP 192.168.10.19

Indirizzo IP richiesto = 192.168.10.19 <<<<<< <> client che richiede l'indirizzo IP assegnato dal server DHCP

Tipo messaggio DHCP = Richiesta DHCP

Frame 47 (370 bytes on wire, 370 bytes captured)

Arrival Time: Jul 19, 2023 21:53:35.342380000

[Time delta from previous captured frame: 0.097649000 seconds]

[Time delta from previous displayed frame: 4.001055000 seconds]

[Time since reference or first frame: 8.621433000 seconds]

Frame Number: 47

Frame Length: 370 bytes

Capture Length: 370 bytes  
[Frame is marked: False]  
[Protocols in frame: eth:vlan:ip:udp:bootp]  
Ethernet II, Src: 00:62:ec:f3:04:b3 (00:62:ec:f3:04:b3), Dst: ff:ff:ff:ff:ff:ff (ff:ff:ff:ff:ff:ff)  
Destination: ff:ff:ff:ff:ff:ff (ff:ff:ff:ff:ff:ff)  
Address: ff:ff:ff:ff:ff:ff (ff:ff:ff:ff:ff:ff)  
.... 1. .... = IG bit: Group address (multicast/broadcast)  
.... 1. .... = LG bit: Locally administered address (this is NOT the factory default)  
Source: 00:62:ec:f3:04:b3 (00:62:ec:f3:04:b3)  
Address: 00:62:ec:f3:04:b3 (00:62:ec:f3:04:b3)  
.... 0. .... = IG bit: Individual address (unicast)  
.... 0. .... = LG bit: Globally unique address (factory default)  
Type: 802.1Q Virtual LAN (0x8100)  
802.1Q Virtual LAN, PRI: 0, CFI: 0, ID: 10  
000. .... = Priority: 0  
...0 .... = CFI: 0  
.... 0000 0000 1010 = ID: 10  
Type: IP (0x0800)  
Internet Protocol, Src: 0.0.0.0 (0.0.0.0), Dst: 255.255.255.255 (255.255.255.255)  
Version: 4  
Header length: 20 bytes  
Differentiated Services Field: 0x00 (DSCP 0x00: Default; ECN: 0x00)  
0000 00.. = Differentiated Services Codepoint: Default (0x00)  
.... ..0. = ECN-Capable Transport (ECT): 0  
.... ...0 = ECN-CE: 0  
Total Length: 352  
Identification: 0x0000 (0)  
Flags: 0x00  
0.. = Reserved bit: Not Set  
.0. = Do not fragment: Not Set  
..0 = More fragments: Not Set  
Fragment offset: 0  
Time to live: 255  
Protocol: UDP (0x11)  
Header checksum: 0xba8d [correct]  
[Good: True]  
[Bad : False]  
Source: 0.0.0.0 (0.0.0.0)  
Destination: 255.255.255.255 (255.255.255.255)  
User Datagram Protocol, Src Port: bootpc (68), Dst Port: bootps (67)  
Source port: bootpc (68)  
Destination port: bootps (67)  
Length: 332  
Checksum: 0xbaae [validation disabled]  
[Good Checksum: False]  
[Bad Checksum: False]  
Bootstrap Protocol  
Message type: Boot Request (1)  
Hardware type: Ethernet  
Hardware address length: 6  
Hops: 0  
Transaction ID: 0x64b14fa7  
Seconds elapsed: 0  
Bootp flags: 0x8000 (Broadcast)  
1... .... = Broadcast flag: Broadcast  
.000 0000 0000 0000 = Reserved flags: 0x0000  
Client IP address: 0.0.0.0 (0.0.0.0)  
Your (client) IP address: 0.0.0.0 (0.0.0.0)  
Next server IP address: 0.0.0.0 (0.0.0.0)  
Relay agent IP address: 0.0.0.0 (0.0.0.0)  
Client MAC address: 00:62:ec:f3:04:b3 (00:62:ec:f3:04:b3)  
Client hardware address padding: 00000000000000000000

Server host name not given  
Boot file name not given  
Magic cookie: (OK)  
Option: (t=53,l=1) DHCP Message Type = DHCP Request  
Option: (53) DHCP Message Type  
Length: 1  
Value: 03  
Option: (t=61,l=18) Client identifier  
Option: (61) Client identifier  
Length: 18  
Value: 0046444F3230323431435548566C616E3130  
Option: (t=50,l=4) Requested IP Address = 192.168.10.19  
Option: (50) Requested IP Address  
Length: 4  
Value: C0A80A13  
Option: (t=51,l=4) IP Address Lease Time = 2 hours  
Option: (51) IP Address Lease Time  
Length: 4  
Value: 00001C20  
Option: (t=54,l=4) DHCP Server Identifier = 192.168.1.2  
Option: (54) DHCP Server Identifier  
Length: 4  
Value: C0A80102  
Option: (t=60,l=19) Vendor class identifier = "Cisco NXOS® N9K-C9372PX-E"  
Option: (60) Vendor class identifier  
Length: 19  
Value: 436973636F204E394B2D433933373250582D45  
Option: (t=43,l=8) Vendor-Specific Information  
Option: (43) Vendor-Specific Information  
Length: 8  
Value: F1060062ECF304AC  
Option: (t=55,l=8) Parameter Request List  
Option: (55) Parameter Request List  
Length: 8  
Value: 010306070C424396  
1 = Subnet Mask  
3 = Router  
6 = Domain Name Server  
7 = Log Server  
12 = Host Name  
66 = TFTP Server Name  
67 = Bootfile name  
150 = TFTP server address  
End Option  
Padding

[6] L'agente di inoltro inoltra la richiesta DHCP dal client al server DHCP.

MAC di origine è nexus MAC: 6c:31:0e:a3:0c:57

L'indirizzo MAC di destinazione è MAC server DHCP: c4:c6:03:09:cf:47

L'indirizzo IP di origine è Nexus IP su SVI10: 192.168.10.1

L'IP di destinazione è l'IP del server DHCP: 192.168.1.2

Porta di origine: bootps (67)

Porta di destinazione: bootps (67)

Tipo di messaggio: Richiesta di avvio (1)

Indirizzo IP richiesto = 192.168.10.19

Indirizzo MAC del client: 00:62:ec:f3:04:b3 <<<<<< L'indirizzo MAC del client è incluso nell'intestazione UDP/DHCP

Tipo messaggio DHCP = Richiesta DHCP

Frame 48 (366 bytes on wire, 366 bytes captured)  
Arrival Time: Jul 19, 2023 21:53:35.343718000  
[Time delta from previous captured frame: 0.001338000 seconds]  
[Time delta from previous displayed frame: 0.001338000 seconds]  
[Time since reference or first frame: 8.622771000 seconds]  
Frame Number: 48  
Frame Length: 366 bytes  
Capture Length: 366 bytes  
[Frame is marked: False]  
[Protocols in frame: eth:ip:udp:bootp]  
Ethernet II, Src: 6c:31:0e:a3:0c:57 (6c:31:0e:a3:0c:57), Dst: c4:c6:03:09:cf:47 (c4:c6:03:09:cf:47)  
Destination: c4:c6:03:09:cf:47 (c4:c6:03:09:cf:47)  
Address: c4:c6:03:09:cf:47 (c4:c6:03:09:cf:47)  
.... 0 .... = IG bit: Individual address (unicast)  
.... 0. .... = LG bit: Globally unique address (factory default)  
Source: 6c:31:0e:a3:0c:57 (6c:31:0e:a3:0c:57)  
Address: 6c:31:0e:a3:0c:57 (6c:31:0e:a3:0c:57)  
.... 0 .... = IG bit: Individual address (unicast)  
.... 0. .... = LG bit: Globally unique address (factory default)  
Type: IP (0x0800)  
Internet Protocol, Src: 192.168.10.1 (192.168.10.1), Dst: 192.168.1.2 (192.168.1.2)  
Version: 4  
Header length: 20 bytes  
Differentiated Services Field: 0x00 (DSCP 0x00: Default; ECN: 0x00)  
0000 00.. = Differentiated Services Codepoint: Default (0x00)  
.... 0. = ECN-Capable Transport (ECT): 0  
.... 0 = ECN-CE: 0  
Total Length: 352  
Identification: 0xefac (61356)  
Flags: 0x00  
0.. = Reserved bit: Not Set  
.0. = Do not fragment: Not Set  
..0 = More fragments: Not Set  
Fragment offset: 0  
Time to live: 255  
Protocol: UDP (0x11)  
Header checksum: 0x3e8c [correct]  
[Good: True]  
[Bad : False]  
Source: 192.168.10.1 (192.168.10.1)  
Destination: 192.168.1.2 (192.168.1.2)  
User Datagram Protocol, Src Port: bootps (67), Dst Port: bootps (67)  
Source port: bootps (67)  
Destination port: bootps (67)  
Length: 332  
Checksum: 0x63b0 [validation disabled]  
[Good Checksum: False]  
[Bad Checksum: False]  
Bootstrap Protocol  
Message type: Boot Request (1)  
Hardware type: Ethernet  
Hardware address length: 6  
Hops: 1  
Transaction ID: 0x64b14fa7  
Seconds elapsed: 0  
Bootp flags: 0x8000 (Broadcast)  
1... .... = Broadcast flag: Broadcast  
.000 0000 0000 0000 = Reserved flags: 0x0000  
Client IP address: 0.0.0.0 (0.0.0.0)  
Your (client) IP address: 0.0.0.0 (0.0.0.0)  
Next server IP address: 0.0.0.0 (0.0.0.0)  
Relay agent IP address: 192.168.10.1 (192.168.10.1)



Client MAC address: 00:62:ec:f3:04:b3 (00:62:ec:f3:04:b3)  
Client hardware address padding: 00000000000000000000  
Server host name not given  
Boot file name not given  
Magic cookie: (OK)  
Option: (t=53,l=1) DHCP Message Type = DHCP Request  
Option: (53) DHCP Message Type  
Length: 1  
Value: 03  
Option: (t=61,l=18) Client identifier  
Option: (61) Client identifier  
Length: 18  
Value: 0046444F3230323431435548566C616E3130  
Option: (t=50,l=4) Requested IP Address = 192.168.10.19  
Option: (50) Requested IP Address  
Length: 4  
Value: C0A80A13  
Option: (t=51,l=4) IP Address Lease Time = 2 hours  
Option: (51) IP Address Lease Time  
Length: 4  
Value: 00001C20  
Option: (t=54,l=4) DHCP Server Identifier = 192.168.1.2  
Option: (54) DHCP Server Identifier  
Length: 4  
Value: C0A80102  
Option: (t=60,l=19) Vendor class identifier = "Cisco N9K-C9372PX-E"  
Option: (60) Vendor class identifier  
Length: 19  
Value: 436973636F204E394B2D433933373250582D45  
Option: (t=43,l=8) Vendor-Specific Information  
Option: (43) Vendor-Specific Information  
Length: 8  
Value: F1060062ECF304AC  
Option: (t=55,l=8) Parameter Request List  
Option: (55) Parameter Request List  
Length: 8  
Value: 010306070C424396  
1 = Subnet Mask  
3 = Router  
6 = Domain Name Server  
7 = Log Server  
12 = Host Name  
66 = TFTP Server Name  
67 = Bootfile name  
150 = TFTP server address  
End Option  
Padding

[7] Il server risponde in modalità unicast (ACK) all'agente di inoltro.  
L'indirizzo MAC di origine è MAC server DHCP: c4:c6:03:09:cf:47  
MAC di destinazione è Nexus MAC: 6c:31:0e:a3:0c:57  
L'indirizzo IP di origine è il server DHCP: 192.168.1.2  
Destinazione IP Nexus IP su SVI10: 192.168.10.1  
Porta di origine: bootps (67)  
Porta di destinazione: bootps (67)  
Tipo di messaggio: Risposta di avvio (2)  
Indirizzo IP (client): 192.168.10.19  
Indirizzo MAC client: 00:62:ec:f3:04:b3  
Tipo di messaggio DHCP = DHCP ACK <<<< Corrisponde all'ACK del server

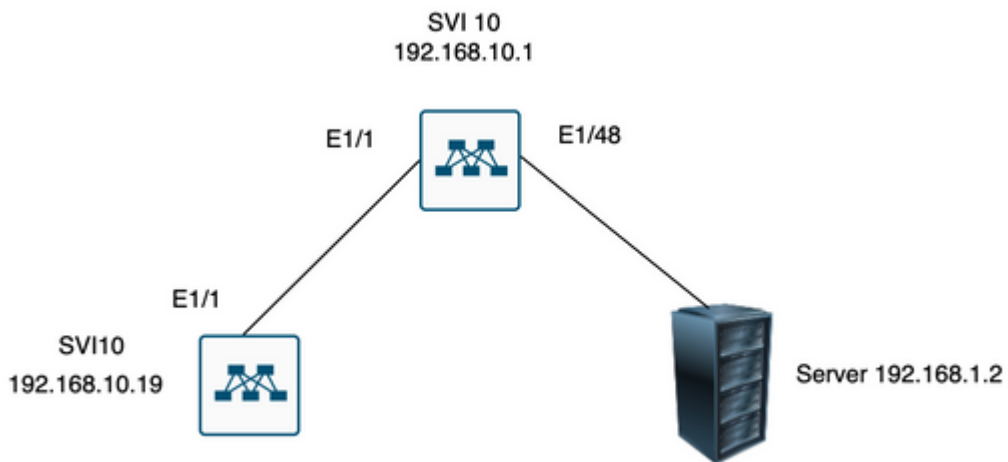
Frame 49 (348 bytes on wire, 348 bytes captured)  
Arrival Time: Jul 19, 2023 21:53:35.344310000  
[Time delta from previous captured frame: 0.000592000 seconds]  
[Time delta from previous displayed frame: 0.000592000 seconds]  
[Time since reference or first frame: 8.623363000 seconds]  
Frame Number: 49  
Frame Length: 348 bytes  
Capture Length: 348 bytes  
[Frame is marked: False]  
[Protocols in frame: eth:ip:udp:bootp]  
Ethernet II, Src: c4:c6:03:09:cf:47 (c4:c6:03:09:cf:47), Dst: 6c:31:0e:a3:0c:57 (6c:31:0e:a3:0c:57)  
Destination: 6c:31:0e:a3:0c:57 (6c:31:0e:a3:0c:57)  
Address: 6c:31:0e:a3:0c:57 (6c:31:0e:a3:0c:57)  
.... 0 = IG bit: Individual address (unicast)  
... 0. = LG bit: Globally unique address (factory default)  
Source: c4:c6:03:09:cf:47 (c4:c6:03:09:cf:47)  
Address: c4:c6:03:09:cf:47 (c4:c6:03:09:cf:47)  
.... 0 = IG bit: Individual address (unicast)  
... 0. = LG bit: Globally unique address (factory default)  
Type: IP (0x0800)  
Internet Protocol, Src: 192.168.1.2 (192.168.1.2), Dst: 192.168.10.1 (192.168.10.1)  
Version: 4  
Header length: 20 bytes  
Differentiated Services Field: 0x00 (DSCP 0x00: Default; ECN: 0x00)  
0000 00.. = Differentiated Services Codepoint: Default (0x00)  
.... 0. = ECN-Capable Transport (ECT): 0  
.... 0 = ECN-CE: 0  
Total Length: 334  
Identification: 0x0015 (21)  
Flags: 0x00  
0.. = Reserved bit: Not Set  
.0. = Do not fragment: Not Set  
..0 = More fragments: Not Set  
Fragment offset: 0  
Time to live: 254  
Protocol: UDP (0x11)  
Header checksum: 0x2f36 [correct]  
[Good: True]  
[Bad : False]  
Source: 192.168.1.2 (192.168.1.2)  
Destination: 192.168.10.1 (192.168.10.1)  
User Datagram Protocol, Src Port: bootps (67), Dst Port: bootps (67)  
Source port: bootps (67)  
Destination port: bootps (67)  
Length: 314  
Checksum: 0x0200 [validation disabled]  
[Good Checksum: False]  
[Bad Checksum: False]  
Bootstrap Protocol  
Message type: Boot Reply (2)  
Hardware type: Ethernet  
Hardware address length: 6  
Hops: 0  
Transaction ID: 0x64b14fa7  
Seconds elapsed: 0  
Bootp flags: 0x8000 (Broadcast)  
1... .. = Broadcast flag: Broadcast  
.000 0000 0000 0000 = Reserved flags: 0x0000  
Client IP address: 0.0.0.0 (0.0.0.0)  
Your (client) IP address: 192.168.10.19 (192.168.10.19)  
Next server IP address: 0.0.0.0 (0.0.0.0)

Relay agent IP address: 192.168.10.1 (192.168.10.1)  
Client MAC address: 00:62:ec:f3:04:b3 (00:62:ec:f3:04:b3)  
Client hardware address padding: 00000000000000000000  
Server host name not given  
Boot file name not given  
Magic cookie: (OK)  
Option: (t=53,l=1) DHCP Message Type = DHCP ACK  
Option: (53) DHCP Message Type  
Length: 1  
Value: 05  
Option: (t=61,l=18) Client identifier  
Option: (61) Client identifier  
Length: 18  
Value: 0046444F3230323431435548566C616E3130  
Option: (t=54,l=4) DHCP Server Identifier = 192.168.1.2  
Option: (54) DHCP Server Identifier  
Length: 4  
Value: C0A80102  
Option: (t=51,l=4) IP Address Lease Time = 1 day  
Option: (51) IP Address Lease Time  
Length: 4  
Value: 00015180  
Option: (t=58,l=4) Renewal Time Value = 12 hours  
Option: (58) Renewal Time Value  
Length: 4  
Value: 0000A8C0  
Option: (t=59,l=4) Rebinding Time Value = 21 hours  
Option: (59) Rebinding Time Value  
Length: 4  
Value: 00012750  
Option: (t=1,l=4) Subnet Mask = 255.255.255.0  
Option: (1) Subnet Mask  
Length: 4  
Value: FFFFFFF0  
Option: (t=3,l=4) Router = 192.168.1.2  
Option: (3) Router  
Length: 4  
Value: C0A80102  
Option: (t=6,l=4) Domain Name Server = 8.8.8.8  
Option: (6) Domain Name Server  
Length: 4  
Value: 08080808  
End Option

A questo punto, il client inizia a utilizzare l'indirizzo IP e conferma che è stato assegnato al client.

```
Client# show interface vlan 10
Vlan10 is up, line protocol is up, autostate enabled
Hardware is EtherSVI, address is 0062.ecf3.04b3
Internet Address is 192.168.10.19/24 <<<<<< It is using the IP address
MTU 1500 bytes, BW 1000000 Kbit, DLY 10 usec,
reliability 255/255, txload 1/255, rxload 1/255
Encapsulation ARPA, loopback not set
Keepalive not supported
ARP type: ARPA
Last clearing of "show interface" counters never
```

L3 in Switched:  
ucast: 0 pkts, 0 bytes  
Client#



â€f

## Informazioni correlate

[Configurazione di DHCP](#)

[Etanalizzatore](#)

## Informazioni su questa traduzione

Cisco ha tradotto questo documento utilizzando una combinazione di tecnologie automatiche e umane per offrire ai nostri utenti in tutto il mondo contenuti di supporto nella propria lingua. Si noti che anche la migliore traduzione automatica non sarà mai accurata come quella fornita da un traduttore professionista. Cisco Systems, Inc. non si assume alcuna responsabilità per l'accuratezza di queste traduzioni e consiglia di consultare sempre il documento originale in inglese (disponibile al link fornito).